

# **CITY OF WHEATLAND**

## **GENERAL PLAN UPDATE**

### **MASTER WATER PLAN**

### **TECHNICAL REPORT**



**Prepared September 28, 2005  
Adopted July 11, 2006**

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**WHEATLAND GENERAL PLAN UPDATE  
MASTER WATER PLAN  
TECHNICAL REPORT  
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## EXECUTIVE SUMMARY

### **General**

The Wheatland General Plan Update (GPU) is a proposed mixed use urban development consisting of residential, commercial, industrial, office, open space, roads, parks, schools and a civic center. Included within the Project site will be a portion of the proposed north-south Highway 65 (HWY65) bypass.

The GPU Preferred Land Use Map was used to establish "villages" which are then assigned a number. Based on the land use for the village and its size, a water demand is determined.

The proposed GPU land uses are shown on Figure 1, and summarized in Table 1.

A summary of approximate areas are as follows:

GPU: Water demand areas	3,469 acres * **
<u>Urban reserve areas (UR)</u>	<u>4,736 acres *</u>
Total GPU area	8,205 acres *
Existing City Limits	<u>480 acres</u>
Total GPU area + City Limits	8,685 acres

\* Area does not include existing UPRR and existing Highway 65

\*\* Water demand areas included in this report

Note that the GPU acreage used in this report does not include the existing City limits water system. The GPU area does include the urban reserve (UR) areas, but no water demands are assigned to the UR areas.

The existing City limits water system was not included in the calculations or model as the existing system was completely rebuilt and modernized in 2001 to 2003 and is completely adequate for the existing City limits.

During final designs, the GPU system will be interconnected to the existing City system for additional looping and redundancy capabilities.

### **Water Demands**

GPU water demands are summarized as follows:

Type water use	Max Day mgd	Annual acre-feet
Domestic residential with irrigation	14.03	6,827
"Other" area domestic (no irrigation)	2.34	1,320
<u>"Other" area irrigation demand</u>	<u>2.53</u>	<u>897</u>
<b>Total</b>	<b>18.90</b>	<b>9,044</b>

Irrigation water demand for non-domestic areas is provided in the report, should the use of recycled wastewater be proposed. The use of recycled water for non-residential areas is quantified and may be of benefit to the area by reducing the amount of domestic water supply needed and some of the domestic system costs, especially the number of wells.

Recycled water (reclaimed water) can be used for irrigation purposes provided it is properly treated. In general, recycled water will come from wastewater treatment plant effluent that has been treated to the clarity required by the State of California Regional Water Quality Control Board and the State Department of Public Health.

Table 1 includes a summary of the GPU domestic use demands by land use types, and Table 2 includes similar information for potential irrigation use demands.

A water system was developed and the system sized using a water model. The water model included only the GPU demand areas including all domestic and irrigation demands, none of the existing City limit demands and no connections to the existing system. When the facilities are designed they will be connected to the existing system.

Fire flow demands are for two fires occurring at one time for a total of 5,000 gpm. One residential fire of 1,500 gpm and one other (i.e. commercial) of 3,500 gpm with a residual pressure of 30 psi.

### **System Size and Model Results**

The results of the system model showed that minimum water pressure at all locations during maximum day demand with a fire flow of 5,000 gpm or under peak hour conditions will be greater than 32 pounds per square inch (psi) which is greater than the criteria of 30 psi established except at five locations. The five locations are all at ends of deadend lines that depending on location will be connected to the existing system or looped when development occurs which will provide for at least 30 psi under the conditions required.

Figure 2 shows the size and component number of the major water system components modeled.

### **System Cost**

For the GPU area, the opinion of probable construction cost is \$36,774,321 and which includes water lines, tanks, wells, standby power, and electronic remote control systems (SCADA) to monitor and control wells, power, and tanks. Table 3 includes the cost estimate for each of the major components.

### **Allocation of System Costs**

The total GPU water system costs are proposed to be shared based on the percentage of a villages maximum day demand compared to the total GPU area maximum day demand. Thus, for the GPU area, using this method, the system cost per maximum day gallon/day is equal to \$1.9456/gallon, or \$2,237/EDU.

Table 4 includes summary by land use types of the unit and total associated costs using the above methodology.

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**I. INTRODUCTION**

**General**

The Wheatland General Plan Update (GPU) is a proposed mixed use urban development area located on approximately 8205-acres surrounding the existing City of Wheatland's (City) approximately 480-acres. The area is currently in the unincorporated area of southern Yuba County and within the City's Sphere of Influence (SOI). The GPU is in general located between Dry Creek on the north, Bear River on the South, Jasper Lane Far West on the east, and west to the existing limits of Wheatland. The area is proposed for eventual annexation to the City and development. The project site is shown, along with its relationship to the City and proposed GPU land uses on Figure 1.

The GPU area is sparsely developed as farmland except on the west side where some large lot residential areas are located.

Because GPU area is proposed to eventually be annexed into the City, the land use entitlement process will be under the jurisdiction of the City, which will serve as the lead agency.

**Project Description**

The GPU proposes a mixed use urban development consisting of residential, commercial, industrial, office, open space, roads, parks, schools and a civic center. Included within the Project site will be a portion of the proposed north-south Highway 65 (HWY65) bypass.

The GPU Preferred Land Use Map was used to establish "villages" which are then assigned a number, based on the land use for the village and its size a water demand is determined.

The proposed GPU land uses are shown on Figure 1, and summarized in Table 1.

A summary of approximate areas are as follows:

GPU: Water demand areas	3,469 acres * **
<u>Urban reserve areas (UR)</u>	<u>4,736 acres *</u>
Total GPU area	8,205 acres *
Existing City Limits	<u>480 acres</u>
Total GPU area + City Limits	8,685 acres

\* Area does not include existing UPRR and existing Highway 65

\*\* Water demand areas included in this report

Note that the GPU acreage used in this report does not include the existing City limits water system. The GPU area does include the urban reserve (UR) areas, but no water demands are assigned to the UR areas.

The existing City limit water system was not included in these calculations or model as the existing system was completely rebuilt and modernized in 2001 to 2003 and is completely adequate for the existing City limits.

During final design, the GPU system will be interconnected to the existing City system for additional looping and redundancy capabilities.

### **Purpose of Water Master Plan**

The purpose of this GPU water master plan (WMP) is to:

1. Estimate water demands needed to serve the GPU land uses;
2. Estimate for non-residential land uses the irrigation water demands that could use recycled wastewater;
3. Include the methodology and criteria used to determine the major water system facilities size for pipes, tanks, wells, and other items
4. Identify the water source supply(s) available that could serve the GPU demands;
5. Estimate the number of wells, water tanks, and other supply sources needed to serve the GPU;
6. Develop a water model and calculate the size and location of the major water lines needed to serve the GPU;
7. Prepare a cost estimate to construct the water lines and supply facilities;
8. Prepare a method of allocation of cost to the various areas for use in a future financing section of the GPU.
9. Provide a summary of the report that can be used in the GPU general report.

The Plan is preliminary and subject to modification and change during processing of the Project through the City and in response to other agency, developer, community, public comments and reviews, and environmental issues.

If water demands change because of adjustments of land uses, the issues to be addressed related to domestic water and recycled water will be the same but to a lesser or greater extent depending on the adjustments made. However, even if changes occur, the basic framework in this WMP can be readily adjusted to recalculate and address the changes.

## **II. JURISDICTIONAL WATER AGENCIES**

### **General**

The City of Wheatland will be the owner operator of the water system.

There are two types of water use needed to serve the Project: domestic and irrigation.

### **Domestic Water**

The GPU area presently proposed for development (does not including the urban reserve, UR, areas) is located in a relatively flat area and will require only one water pressure zone. Domestic use water can be used for both domestic including fire flows and irrigation purposes.

### **Fire Flow Demand**

Fire flow demands are determined by type of structures and location of fire fighting facilities and fire hydrants. In general, for the GPU, fire flow will be assumed to be available from the major water system up to a flow 5,000 gpm. Fire flow demands are for two fires occurring at one time for a total of 5,000 gpm. One residential fire of 1,500 gpm and one other (i.e. commercial) of 3,500 gpm. If a structure, because of type of construction and use would require more than that amount per fire department requirements, then the structure would need to be modified to stay within the fire flow available. Structure modifications can include such items as: changing the type construction to a more fire resistive construction; installation of a fire sprinkler system; alarm and monitoring notification facilities, among others.

### **Irrigation-Recycled Water**

Although not necessarily required, the use of recycled water for non-residential areas is quantified and may be of benefit to the city. Recycled water (reclaimed water) can be used for irrigation purposes provided it is properly treated. In general, recycled water will come from wastewater treatment plant effluent that has been treated to the requirements set by the State of California Regional Water Quality Control Board and the State Department of Public Health.

Recycled water is appropriately treated sewage effluent from wastewater treatment plants.

Recycled water supply systems must be installed in separate lines (purple in color) and separated from domestic water supply lines in accordance with State and agency requirements.

Recycled wastewater could be available from the proposed GPU Wastewater Treatment Plant.

It may be possible to phase in the use of recycled waste water by first using domestic water for irrigation, and as domestic demand increases cut off the irrigation demand.

Some of the benefits associated with using recycled water are that recycled water: reduces the annual demand for domestic water and thus acts as a conservation measure; can reduce the number of domestic water wells and tank sizes needed as well as possible line sizes.

If a recycled water system is incorporated for the GPU area, it is assumed that it will be owned and operated by the City.

### **State of California**

1. Department of Health Services, "Drinking Water Standards".
2. Department of Water Resources, "Water Well Standards".

### **III. PROJECT WATER DEMANDS**

Table 1 provides a summary by land use types and maximum day water demands and equivalent dwelling units (EDU's) if all water for domestic and irrigation is provided from one source. One EDU is defined as the amount of maximum day water used by a single family detached residential lot. One (1) EDU is equivalent to 1150 gallons per day. Table 2 provides average day water demands by land use types for domestic use and non-residential irrigation uses. Demands included in Tables 1 and 2 have been developed from other similar areas within the Sacramento Valley.

Irrigation demand rates per total acre by land use type are derived as follows:

1. Amount of pervious area estimated and assumed irrigated;
2. The annual amount of evaporation that occurs annually in inches is determined over and above that from rainfall during the irrigation season;
3. The amount of irrigation water needed annually is then calculated by multiplying the pervious area x the evaporation amount and converted to gallons and acre-feet.
4. The amount of irrigation water needed on the maximum day is then calculated by multiplying by a peaking factor of 3.16.

GPU water demands are summarized as follows:

<b>Type water use</b>	<b>Max Day mgd</b>	<b>Annual acre-feet</b>
Domestic residential with irrigation	14.03	6,827
"Other" area domestic (no irrigation)	2.34	1,320
<u>"Other" area irrigation demand</u>	<u>2.53</u>	<u>897</u>
<b>Total</b>	<b>18.90</b>	<b>9,044</b>

Appendix A includes a further breakdown of the domestic use information described above and in Table 1. Note that the urban reserve designated areas have no demands assigned to them at this time.

Appendix A contains:

1. Figure A1 of the GPU area with identifying numbers for areas by location and land use type. The identifying numbers for this report are called villages;
2. Table A1 tabulates each village by identifying number, the acreage, number of dwelling units if applicable, their land use type, and the maximum day total water demand.

The Numbering system used for Figure A1 and included in Table A1 is described as follows:

The GPU area was divided into 4 quadrants as follows:

The 100 quadrant:

Is located north of Wheatland Road and west of existing HWY65  
Numbers 160 and up represent areas inside existing City limits.

The 200 quadrant:

Is located north of Spenceville Road and east of existing HWY65  
Numbers 260 and up represent areas inside existing City limits.

The 300 quadrant:

Is located south of Wheatland Road and west of existing HWY65  
Numbers 360 and up represent areas inside existing City limits.

The 400 quadrant:

Is located south of Spenceville Road and east of existing HWY65  
Numbers 460 and up represent areas inside existing City limits.

Appendix B includes the background material and calculations that was used to develop the irrigation rates included above and in Table 2.

#### **IV. METHODOLOGY AND CRITERIA**

##### **General**

The proposed major water system placed water lines in the GPU major road system and was modeled under three conditions using an H2Onet Version 3.0 computer-modeling program as follows:

**Condition 1**, Maximum day demand,

**Condition 2**, Maximum day demand plus 5,000 gpm fire flow at any junction. This condition was modeled rather than a 1,500 gpm and a 3,500 gpm fire at different location for ease of calculation.

**Condition 3**, Peak hour demand.

Condition 3 was modeled to verify that the maximum velocity at any location in the main transmission and/or distribution system pipe would not exceed 5 feet per second.

The water model included only the GPU demand areas including all domestic and irrigation demands and none of the existing City limit demands.

##### **Design Criteria**

1. Land uses:

- a. See Figure 1 and Appendix Figure A1

2. Water demands:

- a. Maximum day demands by type land use, see Table 1 (and Appendix Table A1) = 18.90 MGD.
- b. None of the existing City limit demands are included.

3. Supply Location
  - c. Water well source assumed at locations shown on Figure 2.
  - d. No connections to existing City water system. Note that the system will be interconnected but is not connected for this report.
4. Minimum residual pressure:
  - a. Maximum day demand: 30 psi
  - b. Maximum day demand plus fire flow: 30 psi
  - c. Peak hour demand: 30 psi
5. Pipe sizing:
  - e. Maximum velocity for maximum day plus fire flow: 7 ft/sec
  - f. Maximum velocity for peak hour: 5 ft/sec
  - g. Minimum transmission main size: 12 inch diameter
  - h. Hazen-Williams coefficient: 130
6. Fire flow demands:
  - a. Fire flow demands are for two fires occurring at one time for a total of 5,000 gpm. One residential fire of 1,500 gpm and one other (i.e. commercial) of 3,500 gpm.
  - b. Single Family Residential: 1,500 gpm
  - c. Multi-Family (Table III-A of Uniform Fire Code): 2,500 gpm
  - d. School and Commercial (Table III-A of Uniform Fire Code): 3,500 gpm
7. Pressure zone:
  - i. Pressure elevation: 230-feet
8. Number of water wells:
  - j. All wells with standby power
  - k. Well output/well: 800 gpm
  - l. 18 new wells placed throughout the GPU. Can be combined if needed in some of the quadrants
9. Number and size of tank demands based on:
  - m. Diurnal variation: 25% of maximum day demand = 4.75 mg
  - n. Fire flow storage: 3,500 gpm for 4 hours + 1,500gpm for 2 hours = 1.02 mg
  - o. One tank with booster pump in each quadrant: each tank = 1.50 mg/tank
  - d. All tanks provided with booster pumps and standby power

### **Model Labeling**

1. Pipe Labeling: corresponds to the quadrant number system noted above
2. Junction Labeling: corresponds to the quadrant number system noted above.
3. Tank and Well Labeling: corresponds to the quadrant number system noted above.

## **V. MODELING RESULTS**

The results of the modeling are that under any of the three conditions modeled, the minimum pressure at any location was 32 psi except at five deadend pipe locations explained below. The maximum velocity was 4.7 feet/second. The minimum pressure is greater than the criteria minimum allowed of 30 psi except as noted and the maximum velocity is less than the criteria maximum of 5 feet/second. Therefore the size and location of the major facilities are adequate to meet the GPU system water demands for domestic and irrigation demands. The five exception locations are all at ends of deadend lines that and depending on location will be connected to the existing system or looped when development occurs which will provide for at least 30 psi under the conditions required.

Figure 2 shows the size and item number of the major water system components modeled.

Appendix C Table C1 includes the junction nodal demand calculations.

Appendix D includes the complete results of the modeling output reports for each of the three conditions modeled. Under the three conditions modeled, Table D4a shows the pipes and maximum velocities, and Table D4b shows the maximum nodal pressures.

The H2Onet Computer Files are in drawing:

1. Drawing: K:\1proj\12xx\1252\wheatland-Water-Model-09-22-05.dwg

## **VI. WATER CONSERVATION SAVINGS METHODS**

Water conservation savings methods can be used to decrease domestic water demands. Such methods include devices already required such as shower and toilet low flow devices. Other possible methods to reduce water demands for residential areas are the installation of low flow demand drip irrigation systems; and low water demand landscaping.

## **VII. COST ESTIMATE**

For the GPU area, the opinion of probable construction cost is \$36,774,321, which includes water lines, tanks, wells, standby power, and electronic remote control systems (SCADA) to monitor and control wells, power, and tanks.

Table 3 includes for each component number, the number of units (feet of pipe, number of tanks, etc), the unit price, the total estimated construction cost and total adjusted cost. The adjusted cost includes 30% added to the estimated construction cost for, design, agency plan check and inspection fees, processing, and contingency.

The unit costs per foot for pipe include ARVA, valves, fire hydrants, and services as summarized in Appendix E, Table E1, and are based on recent costs in the Wheatland and Roseville area for similar work.

## VIII. COST ALLOCATION

Allocation of the water system costs was performed using the following assumptions:

1. Because the system is looped, there are no pressure zones, and all areas are benefited by the total system redundancy, the GPU water system costs are to be shared equally by all GPU areas.
2. The total GPU water system costs are to be shared based on the percentage of villages maximum day demand compared to the total GPU area maximum day demand.

Thus, for the GPU area, using the above method, the system cost per maximum day gallon/day is equal to \$1.9456/gallon, (\$36,774,321/18,900,944 gallon) or \$2237/EDU (\$1.946 x 1150).

For example: Village 105's maximum day demand is 415,380 gallons per day, and its share of the system cost would be  $\$1.956 \times 415,380$  which equals \$808,178.

Table 4 includes a summary, by land use types, of the units and total associated costs using the above methodology.

Appendix E, Table E2 contains a breakdown by each village of the respective costs.

# TABLES

**TABLE I**  
**LAND USE SUMMARY**  
**WHEATLAND GPU**  
**MAJOR INFRASTRUCTURE WATER DOMESTIC DEMANDS**  
**July 22, 2005**

LAND USE	DESCRIPTION	ACRES	DWELLING UNITS	WATER DEMAND maximum day		WATER EDU's	
				gpd/unit	total	/unit	total
Single Family Residential							
LDR	Low Density Residential	1824.6	7,298	1150	8,393,114	1.00	7,298
LMDR	Low/Medium Density Res.	434.6	2,173	1150	2,499,008	1.00	2,173
MDR	Medium Density Residential	256.1	2,049	1150	2,356,120	1.00	2,049
Total Single Family Residential		2515.3	11,520		13,248,242		11,520
Other							
PD-12	Residential	0.0	-	690	-	0.60	-
HDR	High Density Residential	70.5	1,129	690	778,762	0.60	677
Total Multi-Family Residential		70.5	1,129		778,762		677
Total Residential		2585.8	12,649		14,027,003		12,197
Other							
C	Commercial	118.6	0	5750	681,663	5.00	593
E	Employment	298.9	0	5750	1,718,790	5.00	1,495
BP	Business Professional	0.0	0	5750	-	5.00	-
P	Park	99.1	0	9000	891,990	7.83	776
Pcp	Community Park	0.0	0	9000	-	7.83	-
MS	Middle School	36.9	0	9000	331,650	7.83	288
HS	High School	51.2	0	9000	460,620	7.83	401
ES	K-6 School	71.8	0	8000	574,000	6.96	499
OS	Open Space	141.8	0	0	-	0.00	-
ROAD	Roads R/W	0.0	0	2250	-	1.96	-
Total Other		818.2	-		4,658,713		4,051
		3404.0	12,649		18,685,716		16,248
BUSINESS PROFESSIONAL							
CC	Civic Center	21.8	-	5750	125,408	5.00	109
WWTP	Wastewater Plant	29.0	-	300	8,688	0.26	8
PB	Other Public	14.1	-	5750	81,133	5.00	71
LI	Light Industrial	0.0	-	5750	-	5.00	-
UR	Urban Reserve	4736.2	-	0	-	0.00	-
65BP	SR65 Bypass/Interchange	0.0	-	2250	-	1.96	-
Total Business Professional		4801.1	-		215,228		187
Grand Total General Plan Study Area		8205.1	12,649		18,900,944		16,436

gpm= 13126

25% of road area.

landusesum@B10

**TABLE II**  
**LAND USE SUMMARY**  
**WHEATLAND GPU**  
**MAJOR INFRASTRUCTURE WATER DOMESTIC AND IRRIGATION DEMANDS**  
**July 22, 2005**

LAND USE	DESCRIPTION	ACRES	DWELLING UNITS	DOMESTIC and IRRIGATION, average day water demands				
				domestic ave. day demand		irrigation ave. day demand		TOTAL
				gpd/unit	total gpd	gpd/unit	total gpd	
Single Family Residential								
LDR	Low Density Residential	1824.6	7,298	500	3,649,180	-	-	3,649,180
LMDR	Low/Medium Density Res.	434.6	2,173	500	1,086,525	-	-	1,086,525
MDR	Medium Density Residential	256.1	2,049	500	1,024,400	-	-	1,024,400
Total Single Family Residential		2515.3	11,520	1750	5,760,105	-	-	5,760,105
Other								
PD-12	Residential	0.0	-	300	-	-	-	-
HDR	High Density Residential	70.5	1,129	300	338,592	-	-	338,592
Total Multi-Family Residential		70.5	1,129		338,592	-	-	338,592
Total Residential		2585.8	12,649		6,098,697	-	-	6,098,697
Other								
C	Commercial	118.6	0	1750	207,463	750	88,913	296,375
E	Employment	298.9	0	1750	523,110	750	224,190	747,300
BP	Business Professional	0.0	0	1750	-	750	-	-
P	Park	99.1	0	1750	173,443	2420	239,846	413,289
Pop	Community Park	0.0	0	1750	-	2420	-	-
MS	Middle School	36.9	0	1500	55,275	1210	44,589	99,864
HS	High School	51.2	0	1000	51,180	1750	89,565	140,745
ES	K-6 School	71.8	0	1400	100,450	1210	86,818	187,268
OS	Open Space	141.8	0	0	-	0	-	-
ROAD	Roads R/W	0.0	0	0	-	605	-	-
Total Other		818.2	-		1,110,920		773,920	1,884,840
		3404.0	12,649		7,209,617		773,920	7,983,537
BUSINESS PROFESSIONAL								
CC	Civic Center	21.8	-	1750	38,168	750	16,358	54,525
WWTP	Wastewater Plant	29.0	-		-		-	-
PB	Other Public	14.1	-	1750	24,693	750	10,583	35,275
LI	Light Industrial	0.0	-	1750	-	750	-	-
UR	Urban Reserve	4736.2	-	0	-	0	-	-
65BP	SR65 Bypass/Interchange	0.0	-	0	-		-	-
Total Business Professional		4801.1	-		62,860		26,940	89,800
Grand Total General Plan Study Area		8205.1	12,649		7,272,477		800,860	8,073,337

acre-feet/yr = 8,147

897 9,044

landusesum@B10

file: K:\proj\12xx\1252\GPUusedemands170105.xls

landusesum@HC14

max day to ave day factor

2.3 for residential uses

1 mgd =

1,120 acre-foot/year

**TABLE III**  
**WATER**  
**WHEATLAND GPU**  
**MAJOR INFRASTRUCTURE WATER COSTS**  
**September 12, 2005**

**TOTAL COST**

ITEM NO			QUANTITY	UNITS	UNIT COST a.	TOTAL	ADJUSTED COST @ 1.3
WATER (Offsite)							
P1101		12 " Water	1664.43	LF	\$ 89	\$148,134	\$192,575
P1102		12 " Water	1012.25	LF	\$ 89	\$90,090	\$117,117
P1103		12 " Water	1646.04	LF	\$ 89	\$146,498	\$190,447
P1104		12 " Water	2248.35	LF	\$ 89	\$200,103	\$260,134
P1105		12 " Water	1377.61	LF	\$ 89	\$122,607	\$159,389
P1106		12 " Water	1654.64	LF	\$ 89	\$147,263	\$191,442
P1107		12 " Water	2267.32	LF	\$ 89	\$201,791	\$262,329
P1108		12 " Water	1382.02	LF	\$ 89	\$123,000	\$159,900
P1109		12 " Water	1654.21	LF	\$ 89	\$147,225	\$191,392
P1110		12 " Water	1012.02	LF	\$ 89	\$90,070	\$117,091
P1111		12 " Water	1272.68	LF	\$ 89	\$113,269	\$147,249
P1112		12 " Water	1381.38	LF	\$ 89	\$122,943	\$159,826
P1113		12 " Water	1291.58	LF	\$ 89	\$114,951	\$149,436
P1114		12 " Water	1235.02	LF	\$ 89	\$109,917	\$142,892
P1115		12 " Water	2055.22	LF	\$ 89	\$182,915	\$237,789
P1116		12 " Water	1297.21	LF	\$ 89	\$115,452	\$150,087
P1117		12 " Water	1269.22	LF	\$ 89	\$112,961	\$146,849
P1118		12 " Water	1425.46	LF	\$ 89	\$126,866	\$164,926
P1120		12 " Water	2016.91	LF	\$ 89	\$179,505	\$233,356
P1121		12 " Water	1313.51	LF	\$ 89	\$116,902	\$151,973
P1122		12 " Water	1295.06	LF	\$ 89	\$115,260	\$149,838
P1124		12 " Water	2607.73	LF	\$ 89	\$232,088	\$301,714
P1125		12 " Water	1323.73	LF	\$ 89	\$117,812	\$153,156
P1126		12 " Water	1311.92	LF	\$ 89	\$116,761	\$151,789
P1127		12 " Water	2357.65	LF	\$ 89	\$209,831	\$272,780
P1128		12 " Water	1331.02	LF	\$ 89	\$118,461	\$153,999
P1150		12 " Water	168.83	LF	\$ 89	\$15,026	\$19,534
P1152		12 " Water	248.67	LF	\$ 89	\$22,132	\$28,771
P1154		12 " Water	180.11	LF	\$ 89	\$16,030	\$20,839
P1156		12 " Water	164.34	LF	\$ 89	\$14,626	\$19,014
P1158		12 " Water	147.46	LF	\$ 89	\$13,124	\$17,061
P1160		12 " Water	154.12	LF	\$ 89	\$13,717	\$17,832
P1162		12 " Water	167.21	LF	\$ 89	\$14,882	\$19,346
P1201		12 " Water	595.32	LF	\$ 89	\$52,983	\$68,879
P1202		12 " Water	2642.03	LF	\$ 89	\$235,141	\$305,683
P1203		12 " Water	1332.18	LF	\$ 89	\$118,564	\$154,133
P1204		12 " Water	2885	LF	\$ 89	\$256,765	\$333,795
P1205		12 " Water	1823.2	LF	\$ 89	\$162,265	\$210,944
P1206		12 " Water	1817.89	LF	\$ 89	\$161,792	\$210,330
P1207		12 " Water	2457.35	LF	\$ 89	\$218,704	\$284,315
P1208		12 " Water	524.32	LF	\$ 89	\$46,664	\$60,664
P1209		12 " Water	1925.1	LF	\$ 89	\$171,334	\$222,734
P1210		12 " Water	1481.61	LF	\$ 89	\$131,863	\$171,422
P1211		12 " Water	1340.04	LF	\$ 89	\$119,264	\$155,043

TABLE III  
WATER  
WHEATLAND GPU  
MAJOR INFRASTRUCTURE WATER COSTS  
September 12, 2005

**TOTAL COST**

ITEM NO			QUANTITY	UNITS	UNIT COST a.	TOTAL	ADJUSTED COST @ 1.3
WATER (Offsite)							
P1212		12 " Water	1413.45	LF	\$ 89	\$125,797	\$163,536
P1213		12 " Water	1353.77	LF	\$ 89	\$120,486	\$156,631
P1215		12 " Water	1263.23	LF	\$ 89	\$112,427	\$146,156
P1216		12 " Water	756.25	LF	\$ 89	\$67,306	\$87,498
P1217		12 " Water	1647.9	LF	\$ 89	\$146,663	\$190,662
P1218		12 " Water	1535.08	LF	\$ 89	\$136,622	\$177,609
P1219		12 " Water	527.69	LF	\$ 89	\$46,964	\$61,054
P1220		12 " Water	582.78	LF	\$ 89	\$51,867	\$67,428
P1250		12 " Water	219.58	LF	\$ 89	\$19,543	\$25,405
P1252		12 " Water	183.32	LF	\$ 89	\$16,315	\$21,210
P1254		12 " Water	164.61	LF	\$ 89	\$14,650	\$19,045
P1256		12 " Water	131.66	LF	\$ 89	\$11,718	\$15,233
P1301		12 " Water	782.7	LF	\$ 89	\$69,660	\$90,558
P1302		12 " Water	3559.48	LF	\$ 89	\$316,794	\$411,832
P1303		12 " Water	965.2	LF	\$ 89	\$85,903	\$111,674
P1304		12 " Water	3262.79	LF	\$ 89	\$290,388	\$377,505
P1305		12 " Water	725.88	LF	\$ 89	\$64,603	\$83,984
P1306		12 " Water	1018.96	LF	\$ 89	\$90,687	\$117,894
P1307		12 " Water	2646.11	LF	\$ 89	\$235,504	\$306,155
P1308		12 " Water	101.18	LF	\$ 89	\$9,005	\$11,707
P1309		12 " Water	957.83	LF	\$ 89	\$85,247	\$110,821
P1310		12 " Water	1752.47	LF	\$ 89	\$155,970	\$202,761
P1311		12 " Water	1066.39	LF	\$ 89	\$94,909	\$123,381
P1312		12 " Water	1457.63	LF	\$ 89	\$129,729	\$168,648
P1313		12 " Water	777.92	LF	\$ 89	\$69,235	\$90,005
P1314		12 " Water	602.58	LF	\$ 89	\$53,630	\$69,719
P1315		12 " Water	2108.76	LF	\$ 89	\$187,680	\$243,984
P1320		12 " Water	1921.65	LF	\$ 89	\$171,027	\$222,335
P1350		12 " Water	160.31	LF	\$ 89	\$14,268	\$18,548
P1352		12 " Water	182.62	LF	\$ 89	\$16,253	\$21,129
P1354		12 " Water	186.18	LF	\$ 89	\$16,570	\$21,541
P1356		12 " Water	219.52	LF	\$ 89	\$19,537	\$25,398
P1358		12 " Water	246.51	LF	\$ 89	\$21,939	\$28,521
P1401		12 " Water	1124.75	LF	\$ 89	\$100,103	\$130,134
P1402		12 " Water	1274.65	LF	\$ 89	\$113,444	\$147,477
P1403		12 " Water	1817.8	LF	\$ 89	\$161,784	\$210,319
P1404		12 " Water	1445.52	LF	\$ 89	\$128,651	\$167,247
P1405		12 " Water	722.82	LF	\$ 89	\$64,331	\$83,630
P1406		12 " Water	2997.96	LF	\$ 89	\$266,818	\$346,864
P1407		12 " Water	3224.26	LF	\$ 89	\$286,959	\$373,047
P1408		12 " Water	744.05	LF	\$ 89	\$66,220	\$86,087
P1409		12 " Water	1920.76	LF	\$ 89	\$170,948	\$222,232
P1410		12 " Water	1238.07	LF	\$ 89	\$110,188	\$143,245
P1450		12 " Water	122.34	LF	\$ 89	\$10,888	\$14,155
P1452		12 " Water	91.36	LF	\$ 89	\$8,131	\$10,570
P1460		12 " Water	197.88	LF	\$ 89	\$17,611	\$22,895
P1462		12 " Water	173.22	LF	\$ 89	\$15,417	\$20,042
T		T Tank	4	EA	\$ 1,800,000	\$7,200,000	\$9,360,000
W		W Well	18	EA	\$ 600,000	\$10,800,000	\$14,040,000
C		C Connections to Existing City	10	EA	\$ 7,000	\$70,000	\$91,000
S		S SCADA	22	EA	\$ 10,000	\$220,000	\$286,000
			112390	TOTAL		\$28,287,940	\$36,774,321

**TABLE IV**  
**LAND USE SUMMARY**  
**WHEATLAND GPU**  
**MAJOR INFRASTRUCTURE**  
**September 12, 2005**

ALLOCATED COSTS								
LAND USE	DESCRIPTION	ACRES	DWELLING  UNITS	WATER DEMAND		WATER EDU's		WATER \$/gal =
				maximum day				1.95
				gpd/unit	total	/unit	total	Total Adjusted Cost
Single Family Residential								
LDR	Low Density Residential	1824.6	7,298	1150	8,393,114	1.00	7,298	\$ 16,329,929
PD-3.3	Residential 70' x 130'	0.0	-	1150	-	1.00	-	\$ -
PD-4	Residential 65' x 120'	0.0	-	1150	-	1.00	-	\$ -
PD-4.5	Residential 55' x 110'	0.0	-	1150	-	1.00	-	\$ -
LMDR	Low/Medium Density Res.	434.6	2,173	1150	2,499,008	1.00	2,173	\$ 4,862,154
MDR	Medium Density Residential	256.1	2,049	1150	2,356,120	1.00	2,049	\$ 4,584,148
Total Single Family Residential		2515.3	11,520		13,248,242		11,520	\$ 25,776,231
Other								
PD-12	Residential	0.0	-	690	-	0.60	-	\$ -
HDR	High Density Residential	70.5	1,129	690	778,762	0.60	677	\$ 1,515,185
Total Multi-Family Residential		70.5	1,129		778,762		677	\$ 1,515,185
Total Residential		2585.8	12,649		14,027,003		12,197	\$ 27,291,416
Other								
C	Commercial	118.6	0	5750	681,663	5.00	593	\$ 1,326,266
E	Employment	298.9	0	5750	1,718,790	5.00	1,495	\$ 3,344,137
BP	Business Professional	0.0	0	5750	-	5.00	-	\$ -
P	Park	99.1	0	9000	891,990	7.83	776	\$ 1,735,486
Pcp	Community Park	0.0	0	9000	-	7.83	-	\$ -
MS	Middle School	36.9	0	9000	331,650	7.83	288	\$ 645,270
HS	High School	51.2	0	9000	460,620	7.83	401	\$ 896,198
ES	K-6 School	71.8	0	8000	574,000	6.96	499	\$ 1,116,794
OS	Open Space	141.8	0	0	-	0.00	-	\$ -
ROAD	Roads R/W	0.0	0	2250	-	1.96	-	\$ -
Total Other		818.2	-		4,658,713		4,051	\$ 9,064,150
		3404.0	12,649		18,685,716		16,248	\$ 36,355,567
BUSINESS PROFESSIONAL								
CC	Civic Center	21.8	-	5750	125,408	5.00	109	\$ 243,997
WWTP	Wastewater Plant	29.0	-	300	8,688	0.26	8	\$ 16,904
PB	Other Public	14.1	-	5750	81,133	5.00	71	\$ 157,854
LI	Light Industrial	0.0	-	5750	-	5.00	-	\$ -
UR	Urban Reserve	4736.2	-	0	-	0.00	-	\$ -
65BP	SR65 Bypass/Interchange	0.0	-	2250	-	1.96	-	\$ -
Total Business Professional		4801.1	-		215,228		187	\$ 418,755
Grand Total General Plan Study Area		8205.1	12,649		18,900,944		16,436	\$ 36,774,321

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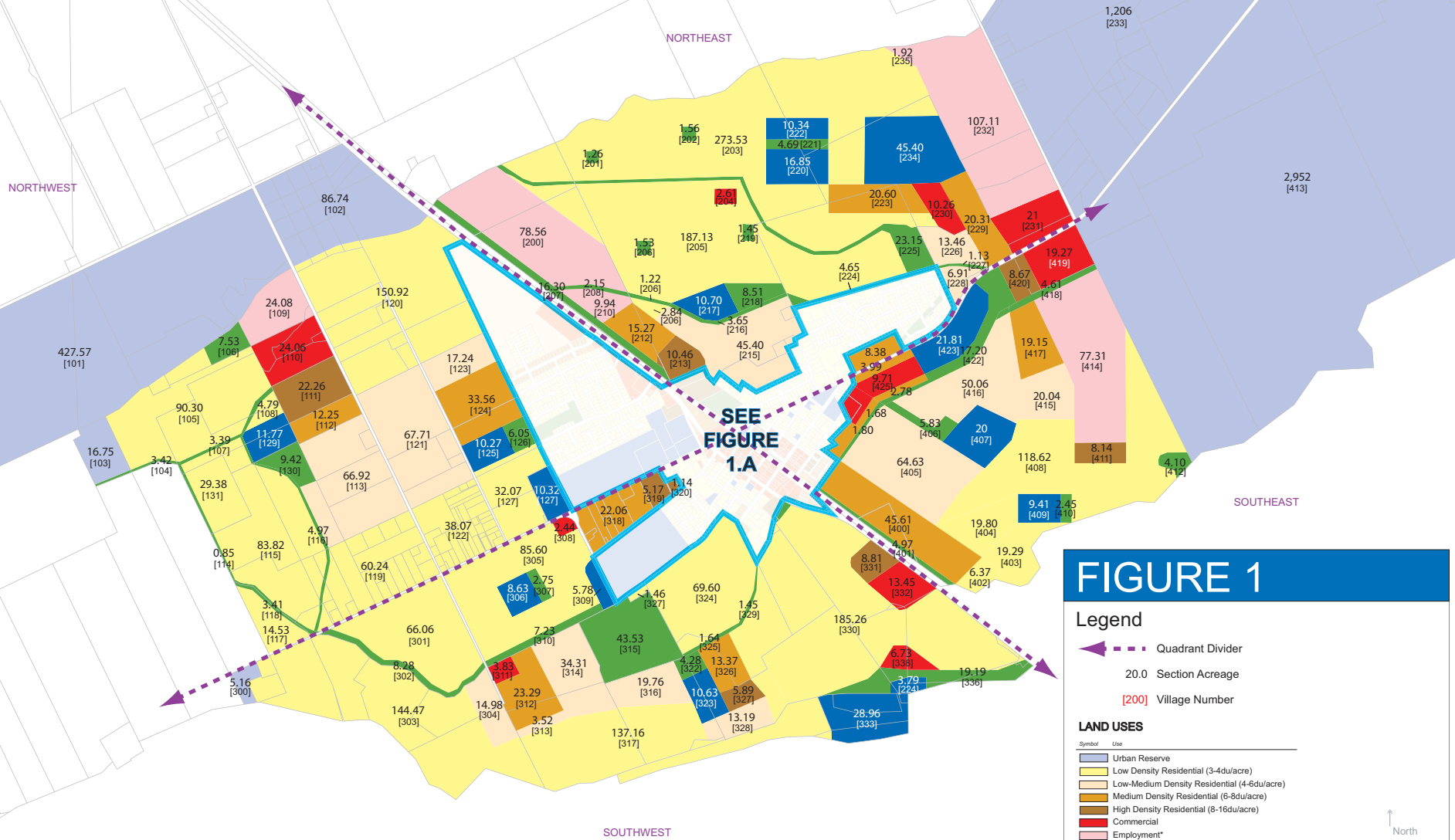
25% of road area.

landusesum@B10

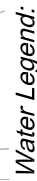
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## FIGURES





# Wheatland GPU Major Infrastructure Areas, by Village



SEPTEMBER 20, 2005



ITEM NUMBER	WATER LINE	DIAMETER, IN /	WELL	TANK
P1101		12"	⊗	⊔

 CITY LIMITS  
 STUDY AREA  
 COUNTY LINE  
 QUADRANT BOUNDARIES

**TERRANCE E. LOWELL  
& ASSOCIATES, INC.**  
*Engineering, Planning & Public Finance*  
1525 EUREKA ROAD, SUITE 100  
ROSEVILLE, CA 95661 916.786.0685

## **APPENDIX A**

TABLE A1  
WHEATLAND GPU  
MAJOR INFRASTRUCTURE  
July 22, 2005

WATER

VILLAGE NO.	ZONING	DESCRIPTION	ACRES	DWELLING UNITS	DU's/ ACRE	WATER DEMANDS			1150	WATER max day gpm
						maximum day gpd/unit	gpd/edu = total gpd	edu's		
100	UR	Urban Reserve	0.00	0	0.00	0	-	-	-	-
101	UR	Urban Reserve	427.57	0	0.00	0	-	-	-	-
102	UR	Urban Reserve	86.74	0	0.00	0	-	-	-	-
103	UR	Urban Reserve	16.75	0	0.00	0	-	-	-	-
104	OS	Open Space	3.42	0	0.00	0	-	-	-	-
105	LDR	Low Density Residential	90.30	361.2	4.00	1150	415,380	361	268	
106	P	Park	7.53	0	0.00	9000	67,770	59	47	
107	OS	Open Space	3.39	0	0.00	0	-	-	-	-
108	LDR	Low Density Residential	4.79	19.16	4.00	1150	22,034	19	15	
109	E	Employment	24.08	0	0.00	5750	138,460	120	96	
110	C	Commercial	24.06	0	0.00	5750	138,345	120	96	
111	HDR	High Density Residential	22.26	356.16	16.00	690	245,750	214	171	
112	MDR	Medium Density Residential	12.25	98	8.00	1150	112,700	98	78	
113	LMDR	Low/Medium Density Res.	66.92	334.6	5.00	1150	384,790	335	267	
114	OS	Open Space	0.85	0	0.00	0	-	-	-	-
115	LDR	Low Density Residential	83.82	335.28	4.00	1150	385,572	335	268	
116	OS	Open Space	4.97	0	0.00	0	-	-	-	-
117	LDR	Low Density Residential	14.53	59.12	4.00	1150	66,838	58	46	
118	OS	Open Space	3.41	0	0.00	0	-	-	-	-
119	LDR	Low Density Residential	60.24	240.96	4.00	1150	277,104	241	192	
120	LDR	Low Density Residential	150.92	603.68	4.00	1150	694,232	604	482	
121	LMDR	Low/Medium Density Res.	67.71	338.55	5.00	1150	389,333	339	270	
122	LDR	Low Density Residential	38.07	152.28	4.00	1150	175,122	152	122	
123	LMDR	Low/Medium Density Res.	17.24	86.2	5.00	1150	99,130	86	69	
124	MDR	Medium Density Residential	33.56	268.48	8.00	1150	308,752	268	214	
125	ES	K-6 School	10.27	0	0.00	8000	82,160	71	57	
126	P	Park	6.05	0	0.00	9000	54,450	47	38	
127	LDR	Low Density Residential	32.07	128.28	4.00	1150	147,522	128	102	
128	PB	Other Public	10.32	0	0.00	5750	59,340	52	41	
129	ES	K-6 School	11.77	0	0.00	8000	94,160	82	65	
130	P	Park	9.42	0	0.00	9000	84,780	74	59	
131	LDR	Low Density Residential	29.38	117.52	4.00	1150	135,148	118	94	
200	E	Employment	78.56	0	0.00	5750	451,720	393	314	
201	P	Park	1.26	0	0.00	9000	11,340	10	8	
202	P	Park	1.56	0	0.00	9000	14,040	12	10	
203	LDR	Low Density Residential	273.53	1094.12	4.00	1150	1,258,238	1,094	874	
204	C	Commercial	2.81	0	0.00	5750	15,008	13	10	
205	LDR	Low Density Residential	187.13	748.52	4.00	1150	860,798	749	598	
206	P	Park	1.53	0	0.00	9000	13,770	12	10	
207	OS	Open Space	16.30	0	0.00	0	-	-	-	-
208	OS	Open Space	2.15	0	0.00	0	-	-	-	-
209	OS	Open Space	1.22	0	0.00	0	-	-	-	-
210	E	Employment	9.94	0	0.00	5750	57,155	50	40	
211	LDR	Low Density Residential	2.84	11.36	4.00	1150	13,064	11	9	
212	MDR	Medium Density Residential	15.27	122.16	8.00	1150	140,484	122	98	
213	HDR	High Density Residential	10.46	167.36	16.00	690	115,478	100	80	
214	MDR	Medium Density Residential	3.49	27.92	8.00	1150	32,108	28	22	
215	LMDR	Low/Medium Density Res.	45.40	227	5.00	1150	261,050	227	181	
216	OS	Open Space	3.65	0	0.00	0	-	-	-	-
217	ES	K-6 School	10.70	0	0.00	8000	85,600	74	59	
218	P	Park	8.51	0	0.00	9000	76,590	67	53	
219	P	Park	1.45	0	0.00	9000	13,050	11	9	
220	MS	Middle School	16.85	0	0.00	9000	151,650	132	105	
221	P	Park	4.69	0	0.00	9000	42,210	37	29	
222	ES	K-6 School	10.34	0	0.00	8000	82,720	72	57	
223	MDR	Medium Density Residential	20.60	164.8	8.00	1150	189,520	165	132	
224	OS	Open Space	4.65	0	0.00	0	-	-	-	-
225	OS	Open Space	23.15	0	0.00	0	-	-	-	-
226	LMDR	Low/Medium Density Res.	13.46	67.3	5.00	1150	77,395	67	54	
227	OS	Open Space	1.13	0	0.00	0	-	-	-	-
228	LMDR	Low/Medium Density Res.	6.91	34.55	5.00	1150	39,733	35	28	
229	MDR	Medium Density Residential	20.31	162.48	8.00	1150	186,852	162	130	
230	C	Commercial	10.26	0	0.00	5750	58,995	51	41	
231	C	Commercial	21.00	0	0.00	5750	120,750	105	84	
232	E	Employment	107.11	0	0.00	5750	615,863	536	428	
233	UR	Urban Reserve	1250.00	0	0.00	0	-	-	-	-
234	HS	High School	45.40	0	0.00	9000	408,600	355	284	
235	E	Employment	1.92	0	0.00	5750	11,040	10	8	
236	LDR	Low Density Residential	0.92	3.68	4.00	1150	4,232	4	3	
237	MDR	Medium Density Residential	8.38	67.04	8.00	1150	77,096	67	54	

238	LDR	Low Density Residential	2.36	9.44	4.00	1150	10,856	9	8
300	UR	Urban Reserve	5.16	0	0.00	0	-	-	-
301	LDR	Low Density Residential	66.06	264.24	4.00	1150	303,876	264	211
302	OS	Open Space	8.28	0	0.00	0	-	-	-
303	LDR	Low Density Residential	144.47	577.88	4.00	1150	664,562	578	462
304	LMDR	Low/Medium Density Res.	14.98	74.9	5.00	1150	86,135	75	60
305	LDR	Low Density Residential	85.60	342.4	4.00	1150	393,760	342	273
306	ES	K-6 School	8.63	0	0.00	8000	69,040	60	48
307	P	Park	2.75	0	0.00	9000	24,750	22	17
308	C	Commercial	2.44	0	0.00	5750	14,030	12	10
309	HS	High School	5.78	0	0.00	9000	52,020	45	36
310	OS	Open Space	7.23	0	0.00	0	-	-	-
311	C	Commercial	3.63	0	0.00	5750	22,023	19	15
312	MDR	Medium Density Residential	23.29	186.32	8.00	1150	214,268	186	149
313	MDR	Medium Density Residential	3.52	28.16	8.00	1150	32,384	28	22
314	LMDR	Low/Medium Density Res.	34.31	171.55	5.00	1150	197,283	172	137
315	P	Park	43.53	0	0.00	9000	391,770	341	272
316	LMDR	Low/Medium Density Res.	19.76	98.8	5.00	1150	113,620	99	79
317	LDR	Low Density Residential	137.16	548.64	4.00	1150	630,936	549	438
318	MDR	Medium Density Residential	22.06	176.48	8.00	1150	202,952	176	141
319	HDR	High Density Residential	5.17	82.72	16.00	690	57,077	50	40
320	HDR	High Density Residential	1.14	18.24	16.00	690	12,506	11	9
321	LDR	Low Density Residential	1.46	5.84	4.00	1150	6,716	6	5
322	P	Park	4.28	0	0.00	9000	38,520	33	27
323	ES	K-6 School	10.63	0	0.00	8000	85,040	74	59
324	LDR	Low Density Residential	69.60	278.4	4.00	1150	320,160	278	222
325	OS	Open Space	1.64	0	0.00	0	-	-	-
326	MDR	Medium Density Residential	13.37	106.96	8.00	1150	123,004	107	85
327	HDR	High Density Residential	5.89	94.24	16.00	690	65,026	57	46
328	LMDR	Low/Medium Density Res.	13.19	65.95	5.00	1150	75,843	66	53
329	OS	Open Space	1.45	0	0.00	0	-	-	-
330	LDR	Low Density Residential	185.26	741.04	4.00	1150	862,196	741	592
331	HDR	High Density Residential	8.81	140.96	16.00	690	97,262	85	68
332	C	Commercial	13.45	0	0.00	5750	77,338	67	54
333	WWTP	Wastewater Plant	28.96	0	0.00	300	8,688	8	6
334	PB	Other Public	3.79	0	0.00	5750	21,793	19	15
335	C	Commercial	6.73	0	0.00	5750	38,698	34	27
336	OS	Open Space	19.19	0	0.00	0	-	-	-
400	MDR	Medium Density Residential	45.61	364.88	8.00	1150	419,612	365	291
401	OS	Open Space	4.97	0	0.00	0	-	-	-
402	LDR	Low Density Residential	6.37	25.48	4.00	1150	29,302	25	20
403	LDR	Low Density Residential	19.29	77.16	4.00	1150	88,734	77	62
404	LDR	Low Density Residential	19.80	79.2	4.00	1150	91,080	79	63
405	LMDR	Low/Medium Density Res.	64.63	323.15	5.00	1150	371,623	323	258
406	OS	Open Space	5.83	0	0.00	0	-	-	-
407	MS	Middle School	20.00	0	0.00	9000	180,000	157	125
408	LDR	Low Density Residential	118.62	474.48	4.00	1150	545,652	474	379
409	ES	K-6 School	9.41	0	0.00	8000	75,280	65	52
410	P	Park	2.45	0	0.00	9000	22,050	19	15
411	HDR	High Density Residential	8.14	130.24	16.00	690	89,866	78	62
412	P	Park	4.10	0	0.00	9000	36,900	32	26
413	UR	Urban Reserve	2950.00	0	0.00	0	-	-	-
414	E	Employment	77.31	0	0.00	5750	444,533	387	309
415	LMDR	Low/Medium Density Res.	20.04	100.2	5.00	1150	115,230	100	80
416	LMDR	Low/Medium Density Res.	50.06	250.3	5.00	1150	287,845	250	200
417	MDR	Medium Density Residential	19.15	153.2	8.00	1150	176,180	153	122
418	OS	Open Space	4.61	0	0.00	0	-	-	-
419	C	Commercial	19.27	0	0.00	5750	110,803	96	77
420	HDR	High Density Residential	8.67	138.72	16.00	690	95,717	83	66
421	OS	Open Space	0.54	0	0.00	0	-	-	-
422	OS	Open Space	17.20	0	0.00	0	-	-	-
423	CC	Civic Center	21.81	0	0.00	5750	125,408	109	87
424	MDR	Medium Density Residential	2.78	22.24	8.00	1150	25,576	22	18
425	C	Commercial	9.71	0	0.00	5750	55,833	49	39
426	MDR	Medium Density Residential	3.99	31.92	8.00	1150	36,708	32	25
427	MDR	Medium Density Residential	1.68	13.44	8.00	1150	15,456	13	11
428	C	Commercial	5.19	0	0.00	5750	29,843	26	21
429	OS	Open Space	1.80	0	0.00	0	-	-	-
430	MDR	Medium Density Residential	4.15	33.2	8.00	1150	38,180	33	27
431	OS	Open Space	0.78	0	0.00	0	-	-	-
432	MDR	Medium Density Residential	2.64	21.12	8.00	1150	24,288	21	17
Total Wheatland GPU			8205.1	12649			18,900,944	16,436	13,126
Total OTHER			0.0	0			-	-	-
Grand Total			8205.1	12649			18,900,944	16,436	13,126

## **APPENDIX B**

**TABLE B1**  
**WHEATLAND GENERAL PLAN UPDATE**  
**IRRIGATION RATE ANNUAL DEMAND, AND AVERAGE DAILY DEMAND**  
**FOR NON RESIDENTIAL LAND USES**  
**July 22, 2004**

Land Use	Description	Pervious coverage %/acre	Annual Demand		Average Day Demand gpd/acre
			AF/acre Irrigated	AF Per Gross Acre	
C	Commercial	23%	3.62	0.840	750
E	Employment	23%	3.62	0.840	750
BP	Business Professional	23%	3.62	0.840	750
P	Park	75%	3.62	2.711	2420
Pcp	Community Park	75%	3.62	2.711	2420
MS	Middle School	37%	3.62	1.356	1210
HS	High School	54%	3.62	1.960	1750
ES	K-6 School	37%	3.62	1.356	1210
OS	Open Space	0%	3.62	0.000	0
ROAD	Roads R/W	19%	3.62	0.678	605
CC	Civic Center	23%	3.62	0.840	750
WWTP	Wastewater Plant	0%	3.62	0.000	0
PB	Other Public	23%	3.62	0.840	750
LI	Light Industrial	23%	3.62	0.840	750
UR		0%	3.62	0.000	
65BP				0.000	

- Notes: a. The annual irrigation water demand for areas based upon the evaporation/transpiration rate for the area = 3.62 feet/year.  
The amount required is estimated to be similar for the Placer Co/ City of Roseville area.
- b. 1 AF/per year = 892.7 gpd/acre average day demand.

File: K:\proj\12xx\1252\water\spreadsheets\irruse.xls  
Source: Terrance E. Lowell & Associates

**Precipitation:** Annual precipitation data for the Sacramento area was obtained from the California DWR. Annual rainfall values from 1850 through 1998 were averaged to obtain typical annual rainfall data. A breakdown of rainfall by month was calculated using typical monthly rainfall percentages (DWR Bulletin No. 113-3).

**Estimated Unit Irrigation Demands:** Typical monthly unit irrigation demands for turf grasses are summarized in Table 1 and were calculated using the following formula:

$$ID = \frac{(ET - Pe_p)I_r}{e_i}$$

where:

ID = Irrigation demand in inches

ET = Evapotranspiration for turf grasses in the City

P = Average precipitation, DWR

$e_p$  = Precipitation irrigation efficiency, 0.8. Assumes 20% of rainfall during growing season is lost to evaporation, runoff, etc.

$I_r$  = Loss Rate, equal to 1.1. This assumes that approximately 10% of the applied water passes through the grass root zone and is lost.

$e_i$  = Irrigation efficiency, equal to 0.8 - 0.9 depending on season. This assumes that 10 - 20% of the applied irrigation water is lost to evaporation.

As shown in Table 1, the total annual unit irrigation demand for grasses is estimated at 43.4 inches. A peak monthly irrigation demand of 9.2 inches is projected for July. The irrigation demand for a winter month is assumed to never fall below zero. For months during which the irrigation demand is positive, additional water from the irrigation system is required. The typical season for irrigation demands stretches between April and October, with a small amount of irrigation necessary in March. No irrigation demands are projected between November and February.

**Table 1: Typical Irrigation Demands for the Placer Ranch Area (City of Roseville) Turf Grasses**

Month	ET (Inches)	P (Inches)	ID (Inches)	ID (Feet)
January	0.88	3.57	0.0	0.00
February	1.36	3.24	0.0	0.00
March	2.48	2.45	0.6	0.04
April	3.76	1.52	3.3	0.27
May	4.96	0.71	5.7	0.48
June	6.16	0.24	8.0	0.67
July	6.80	0.02	9.2	0.77
August	5.84	0.04	8.0	0.67
September	4.48	0.24	5.8	0.48
October	2.96	0.97	2.8	0.24
November	1.28	1.68	0.0	0.00
December	0.80	3.63	0.0	0.00
Average			3.6	0.30
Total	41.76	18.31	43.4	3.62

## **APPENDIX C**

[illegible]

C1  
WHEATLAND GPU  
MAJOR INFRASTRUCTURE ALLOCATED COSTS  
JULY 22, 2005

VILLAGE NO.	J202	J210	J211	J212	J213	J214	J215	J25	J201	J202	J203	J204	J205	J206	J207	J208	J209	J210	J211	J212	J213	J214	J215	J216	J217	J218	J219	J220	J221	J222	J223	J224	J225	J226	J227	J228	J229	J230	J231	J232	J233	J234	J235	J236	J237	J238	J239	J240	J241	J242	J243	J244	J245	J246	J247	J248	J249	J250	J251	J252	J253	J254	J255	J256	J257	J258	J259	J260	J261	J262	J263	J264	J265	J266	J267	J268	J269	J270	J271	J272	J273	J274	J275	J276	J277	J278	J279	J280	J281	J282	J283	J284	J285	J286	J287	J288	J289	J290	J291	J292	J293	J294	J295	J296	J297	J298	J299	J300	J301	J302	J303	J304	J305	J306	J307	J308	J309	J310	J311	J312	J313	J314	J315	J316	J317	J318	J319	J320	J321	J322	J323	J324	J325	J326	J327	J328	J329	J330	J331	J332	J333	J334	J335	J336	J337	J338	J339	J340	J341	J342	J343	J344	J345	J346	J347	J348	J349	J350	J351	J352	J353	J354	J355	J356	J357	J358	J359	J360	J361	J362	J363	J364	J365	J366	J367	J368	J369	J370	J371	J372	J373	J374	J375	J376	J377	J378	J379	J380	J381	J382	J383	J384	J385	J386	J387	J388	J389	J390	J391	J392	J393	J394	J395	J396	J397	J398	J399	J400	J401	J402	J403	J404	J405	J406	J407	J408	J409	J410	J411	J412	J413	J414	J415	J416	J417	J418	J419	J420	J421	J422	J423	J424	J425	J426	J427	J428	J429	J430	J431	J432	J433	J434	J435	J436	J437	J438	J439	J440	J441	J442	J443	J444	J445	J446	J447	J448	J449	J450	J451	J452	J453	J454	J455	J456	J457	J458	J459	J460	J461	J462	J463	J464	J465	J466	J467	J468	J469	J470	J471	J472	J473	J474	J475	J476	J477	J478	J479	J480	J481	J482	J483	J484	J485	J486	J487	J488	J489	J490	J491	J492	J493	J494	J495	J496	J497	J498	J499	J500	J501	J502	J503	J504	J505	J506	J507	J508	J509	J510	J511	J512	J513	J514	J515	J516	J517	J518	J519	J520	J521	J522	J523	J524	J525	J526	J527	J528	J529	J530	J531	J532	J533	J534	J535	J536	J537	J538	J539	J540	J541	J542	J543	J544	J545	J546	J547	J548	J549	J550	J551	J552	J553	J554	J555	J556	J557	J558	J559	J560	J561	J562	J563	J564	J565	J566	J567	J568	J569	J570	J571	J572	J573	J574	J575	J576	J577	J578	J579	J580	J581	J582	J583	J584	J585	J586	J587	J588	J589	J590	J591	J592	J593	J594	J595	J596	J597	J598	J599	J600	J601	J602	J603	J604	J605	J606	J607	J608	J609	J610	J611	J612	J613	J614	J615	J616	J617	J618	J619	J620	J621	J622	J623	J624	J625	J626	J627	J628	J629	J630	J631	J632	J633	J634	J635	J636	J637	J638	J639	J640	J641	J642	J643	J644	J645	J646	J647	J648	J649	J650	J651	J652	J653	J654	J655	J656	J657	J658	J659	J660	J661	J662	J663	J664	J665	J666	J667	J668	J669	J670	J671	J672	J673	J674	J675	J676	J677	J678	J679	J680	J681	J682	J683	J684	J685	J686	J687	J688	J689	J690	J691	J692	J693	J694	J695	J696	J697	J698	J699	J700	J701	J702	J703	J704	J705	J706	J707	J708	J709	J710	J711	J712	J713	J714	J715	J716	J717	J718	J719	J720	J721	J722	J723	J724	J725	J726	J727	J728	J729	J730	J731	J732	J733	J734	J735	J736	J737	J738	J739	J740	J741	J742	J743	J744	J745	J746	J747	J748	J749	J750	J751	J752	J753	J754	J755	J756	J757	J758	J759	J760	J761	J762	J763	J764	J765	J766	J767	J768	J769	J770	J771	J772	J773	J774	J775	J776	J777	J778	J779	J780	J781	J782	J783	J784	J785	J786	J787	J788	J789	J790	J791	J792	J793	J794	J795	J796	J797	J798	J799	J800	J801	J802	J803	J804	J805	J806	J807	J808	J809	J810	J811	J812	J813	J814	J815	J816	J817	J818	J819	J820	J821	J822	J823	J824	J825	J826	J827	J828	J829	J830	J831	J832	J833	J834	J835	J836	J837	J838	J839	J840	J841	J842	J843	J844	J845	J846	J847	J848	J849	J850	J851	J852	J853	J854	J855	J856	J857	J858	J859	J860	J861	J862	J863	J864	J865	J866	J867	J868	J869	J870	J871	J872	J873	J874	J875	J876	J877	J878	J879	J880	J881	J882	J883	J884	J885	J886	J887	J888	J889	J890	J891	J892	J893	J894	J895	J896	J897	J898	J899	J900	J901	J902	J903	J904	J905	J906	J907	J908	J909	J910	J911	J912	J913	J914	J915	J916	J917	J918	J919	J920	J921	J922	J923	J924	J925	J926	J927	J928	J929	J930	J931	J932	J933	J934	J935	J936	J937	J938	J939	J940	J941	J942	J943	J944	J945	J946	J947	J948	J949	J950	J951	J952	J953	J954	J955	J956	J957	J958	J959	J960	J961	J962	J963	J964	J965	J966	J967	J968	J969	J970	J971	J972	J973	J974	J975	J976	J977	J978	J979	J980	J981	J982	J983	J984	J985	J986	J987	J988	J989	J990	J991	J992	J993	J994	J995	J996	J997	J998	J999	J1000	J1001	J1002	J1003	J1004	J1005	J1006	J1007	J1008	J1009	J1010	J1011	J1012	J1013	J1014	J1015	J1016	J1017	J1018	J1019	J1020	J1021	J1022	J1023	J1024	J1025	J1026	J1027	J1028	J1029	J1030	J1031	J1032	J1033	J1034	J1035	J1036	J1037	J1038	J1039	J1040	J1041	J1042	J1043	J1044	J1045	J1046	J1047	J1048	J1049	J1050	J1051	J1052	J1053	J1054	J1055	J1056	J1057	J1058	J1059	J1060	J1061	J1062	J1063	J1064	J1065	J1066	J1067	J1068	J1069	J1070	J1071	J1072	J1073	J1074	J1075	J1076	J1077	J1078	J1079	J1080	J1081	J1082	J1083	J1084	J1085	J1086	J1087	J1088	J1089	J1090	J1091	J1092	J1093	J1094	J1095	J1096	J1097	J1098	J1099	J1100	J1101	J1102	J1103	J1104	J1105	J1106	J1107	J1108	J1109	J1110	J1111	J1112	J1113	J1114	J1115	J1116	J1117	J1118	J1119	J1120	J1121	J1122	J1123	J1124	J1125	J1126	J1127	J1128	J1129	J1130	J1131	J1132	J1133	J1134	J1135	J1136	J1137	J1138	J1139	J1140	J1141	J1142	J1143	J1144	J1145	J1146	J1147	J1148	J1149	J1150	J1151	J1152	J1153	J1154	J1155	J1156	J1157	J1158	J1159	J1160	J1161	J1162	J1163	J1164	J1165	J1166	J1167	J1168	J1169	J1170	J1171	J1172	J1173	J1174	J1175	J1176	J1177	J1178	J1179	J1180	J1181	J1182	J1183	J1184	J1185	J1186	J1187	J1188	J1189	J1190	J1191	J1192	J1193	J1194	J1195	J1196	J1197	J1198	J1199	J1200	J1201	J1202	J1203	J1204	J1205	J1206	J1207	J1208	J1209	J1210	J1211	J1212	J1213	J1214	J1215	J1216	J1217	J1218	J1219	J1220	J1221	J1222	J1223	J1224	J1225	J1226	J1227	J1228	J1229	J1230	J1231	J1232	J1233	J1234	J1235	J1236	J1237	J1238	J1239	J1240	J1241	J1242	J1243	J1244	J1245	J1246	J1247	J1248	J1249	J1250	J1251	J1252	J1253	J1254	J1255	J1256	J1257	J1258	J1259	J1260	J1261	J1262	J1263	J1264	J1265	J1266	J1267	J1268	J1269	J1270	J1271	J1272	J1273	J1274	J1275	J1276	J1277	J1278	J1279	J1280	J1281	J1282	J1283	J1284	J1285	J1286	J1287	J1288	J1289	J1290	J1291	J1292	J1293	J1294	J1295	J1296	J1297	J1298	J1299	J1300	J1301	J1302	J1303	J1304	J1305	J1306	J1307	J1308	J1309	J1310	J1311	J1312	J1313	J1314	J1315	J1316	J1317	J1318	J1319	J1320	J1321	J1322	J1323	J1324	J1325	J1326	J1327	J1328	J1329	J1330	J1331	J1332	J1333	J1334	J1335	J1336	J1337	J1338	J1339	J1340	J1341	J1342	J1343	J1344	J1345	J1346	J1347	J1348	J1349	J1350	J1351	J1352	J1353	J1354	J1355	J1356	J1357	J1358	J1359	J1360	J1361	J1362	J1363	J1364	J1365	J1366	J1367	J1368	J1369	J1370	J1371	J1372	J1373	J1374	J1375	J1376	J1377	J1378	J1379	J1380	J1381	J1382	J1383	J1384	J1385	J1386	J1387	J1388	J1389	J1390	J1391	J1392	J1393	J1394	J1395	J1396	J1397	J1398	J1399	J1400	J1401	J1402	J1403	J1404	J1405	J1406	J1407	J1408	J1409	J1410	J1411	J1412	J1413	J1414	J1415	J1416	J1417	J1418	J1419	J1420	J1421	J1422	J1423	J1424	J1425	J1426	J1427	J1428	J1429	J1430	J1431	J1432	J1433	J1434	J1435	J1436	J1437	J1438	J1439	J1440	J1441	J1442	J1443	J1444	J1445	J1446	J1447	J1448	J1449	J1450	J1451	J1452	J1453	J1454	J1455	J1456	J1457	J1458	J1459	J1460	J1461	J1462	J1463	J1464	J1465	J1466	J1467	J1468	J1469	J1470	J1471	J1472	J1473	J1474	J1475	J1476	J1477	J1478	J1479	J1480	J1481	J1482	J1483	J1484	J1485	J1486	J1487	J1488	J1489	J1490	J1491	J1492	J1493	J1494	J1495	J1496	J1497	J1498	J1499	J1500	J1501	J1502	J1503	J1504	J1505	J1506	J1507	J1508	J1509	J1510	J1511	J1512	J1513	J1514	J1515	J1516	J1517	J1518	J1519	J1520	J1521	J1522	J1523	J1524	J1525	J1526	J1527	J1528	J1529	J1530	J1531	J1532	J1533	J1534	J1535	J1536	J1537	J1538	J1539	J1540	J1541	J1542	J1543	J1544	J1545	J1546	J1547	J1548	J1549	J1550	J1551	J1552	J1553	J1554	J1555	J1556	J1557	J1558	J1559	J1560	J1561	J1562	J1563	J1564	J1565	J1566	J1567	J1568	J1569	J1570	J1571	J1572	J1573	J1574	J1575	J1576	J1577	J1578	J1579	J1580	J1581	J1582	J1583	J1584	J1585	J1586	J1587	J1588	J1589	J1590	J1591	J1592	J1593	J1594	J1595	J1596	J1597	J1598	J1599	J1600	J1601	J1602	J1603	J1604	J1605	J1606	J1607	J1608	J1609	J1610	J1611	J1612	J1613	J1614	J1615	J1616	J1617	J1618	J1619	J1620	J1621	J1622	J1623	J1624	J1625	J1626	J1627	J1628	J1629	J1630	J1631	J1632	J1633	J1634	J1635	J1636	J1637	J1638	J1639	J1640	J1641	J1642	J1643	J1644	J1645	J
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## **APPENDIX D**

***Maximum Daily Demand***

**TABLE D1.1**  
**Maximum Day Demands**  
**Pipe Report**

**Minimum Pipe Sizes**

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft.)
P1101	J1101	J1117	1,664	12	150	0.0	0.0	0
P1102	J1117	J1102	1,012	12	150	0.0	0.0	0
P1103	J1102	J1105	1,646	12	150	-209.0	0.6	0.18
P1104	J1105	J1110	2,248	12	150	-198.1	0.6	0.22
P1105	J1110	J1114	1,378	12	150	-13.9	0.0	0
P1106	J1103	J1106	1,655	12	150	127.0	0.4	0.07
P1107	J1106	J1111	2,267	12	150	-127.6	0.4	0.1
P1108	J1111	J1115	1,382	12	150	189.2	0.5	0.12
P1109	J1104	J1107	1,654	12	150	-149.3	0.4	0.1
P1110	J1107	C1108	1,012	12	150	197.4	0.6	0.1
P1111	C1108	C1112	1,273	12	150	89.4	0.3	0.03
P1112	C1112	C1116	1,381	12	150	136.5	0.4	0.07
P1113	J1102	J1103	1,292	12	150	-416.0	1.2	0.49
P1114	J1103	J1104	1,235	12	150	-31.5	0.1	0
P1115	J1104	J1201	2,055	12	150	20.9	0.1	0
P1116	J1105	J1106	1,297	12	150	-285.9	0.8	0.25
P1117	J1106	J1107	1,269	12	150	-235.4	0.7	0.17
P1118	J1107	C1161	1,425	12	150	0.0	0.0	0
P1120	J1109	J1110	2,017	12	150	213.0	0.6	0.22
P1121	J1110	J1111	1,314	12	150	-198.2	0.6	0.13
P1122	J1111	C1112	1,295	12	150	125.1	0.4	0.05
P1124	J1113	J1114	2,608	12	150	228.2	0.7	0.33
P1125	J1114	J1115	1,324	12	150	-28.3	0.1	0
P1126	J1115	C1116	1,312	12	150	-22.2	0.1	0
P1127	J1105	J1118	2,358	12	150	-313.0	0.9	0.53
P1128	J1118	J1119	1,331	12	150	0.0	0.0	0
P1150	J1118	RES1103	169	12	150	-313.0	0.9	0.04
P1152	J1103	RES1101	249	12	150	-704.5	2.0	0.25
P1154	J1107	RES1102	180	12	150	-641.1	1.8	0.15
P1156	J1201	RES1201	164	12	150	-879.5	2.5	0.25
P1158	J1111	RES1105	147	12	150	-879.1	2.5	0.23
P1160	J1109	RES1104	154	12	150	-636.0	1.8	0.13
P1162	J1113	RES1301	167	12	150	-244.3	0.7	0.02
P1201	J1201	J1214	595	12	150	142.3	0.4	0.03
P1202	J1214	J1202	2,642	12	150	90.3	0.3	0.06
P1203	J1203	J1202	1,332	12	150	129.1	0.4	0.06
P1204	J1203	J1204	2,885	12	150	8.4	0.0	0
P1205	J1204	J1215	1,823	12	150	0.0	0.0	0
P1206	J1205	J1204	1,818	12	150	127.0	0.4	0.08
P1207	J1213	J1203	2,457	12	150	-116.7	0.3	0.09
P1208	J1213	C-67	524	12	150	38.7	0.1	0
P1209	J1202	J1212	1,925	12	150	-225.6	0.6	0.24
P1210	J1212	J1208	1,482	12	150	280.9	0.8	0.27
P1211	J1210	J1201	1,340	12	150	-306.1	0.9	0.29
P1212	J1211	J1210	1,413	12	150	-61.1	0.2	0.02

P1213	J1207	J1211	1,353.77	12	150	-12.08	0.0	0
P1215	J1208	J1207	1,263.23	12	150	243.29	0.7	0.18
P1216	J1208	C-67	756.25	12	150	-37.62	0.1	0
P1217	J1205	J1206	1,647.90	12	150	-189.18	0.5	0.15
P1218	J1205	J-125	1,535.08	12	150	0	0.0	0
P1219	J1208	J-64	527.69	12	150	2.22	0.0	0
P1220	J1207	C-60	582.78	12	150	0.37	0.0	0
P1250	J1206	RES1205	219.58	12	150	-350.18	1.0	0.06
P1252	J1204	RES1204	183.32	12	150	-886.62	2.5	0.29
P1254	J1203	RES1203	164.61	12	150	-938.26	2.7	0.28
P1256	J1212	RES1202	131.66	12	150	-619.49	1.8	0.11
P1301	J1301	J1304	782.7	12	150	407.56	1.2	0.29
P1302	J1304	J1305	3,559.48	12	150	-46.44	0.1	0.02
P1303	J1305	J1306	965.2	12	150	-396.44	1.1	0.34
P1304	J1306	J1307	3,262.79	12	150	-25.55	0.1	0.01
P1305	J1307	J1310	725.88	12	150	-227.88	0.7	0.09
P1306	J1307	J1309	1,018.96	12	150	-250.52	0.7	0.15
P1307	J1302	J1301	2,646.11	12	150	98.63	0.3	0.07
P1308	J-370	J1302	101.18	12	150	-164.64	0.5	0.01
P1309	C1116	J-370	957.83	12	150	-164.64	0.5	0.07
P1310	J1302	J1303	1,752.47	12	150	223.74	0.6	0.21
P1311	J1303	C-7	1,066.39	12	150	0.74	0.0	0
P1312	J1307	J1308	1,457.63	12	150	-124.15	0.4	0.06
P1313	J1308	J1310	777.92	12	150	-124.15	0.4	0.03
P1314	J1310	J1309	602.58	12	150	-203.45	0.6	0.06
P1315	J1309	C-106	2,108.76	12	150	1.11	0.0	0
P1320	J1301	J1114	1,921.65	12	150	36.37	0.1	0.01
P1350	J1113	RES1301	160.31	12	150	-249.89	0.7	0.02
P1352	RES1303	J1302	182.62	12	150	869.01	2.5	0.27
P1354	J1301	RES1302	186.18	12	150	-973.3	2.8	0.34
P1356	J1306	RES1304	219.52	12	150	-782.89	2.2	0.27
P1358	J1309	RES1305	246.51	12	150	-455.07	1.3	0.11
P1401	J1310	J1401	1,124.75	12	150	-148.58	0.4	0.06
P1402	J1401	J1402	1,274.65	12	150	417.43	1.2	0.49
P1403	J1402	J1404	1,817.80	12	150	-69.56	0.2	0.03
P1404	J1404	J1406	1,445.52	12	150	-371.56	1.1	0.45
P1405	J1406	J1205	722.82	12	150	215.82	0.6	0.08
P1406	J1401	C-29	2,997.96	12	150	2.59	0.0	0
P1407	J1402	C-12	3,224.26	12	150	2.22	0.0	0
P1408	J1402	J1405	744.05	12	150	-217.23	0.6	0.09
P1409	J1405	J1403	1,920.76	12	150	-285.23	0.8	0.37
P1410	J1403	J1407	1,238.07	12	150	0	0.0	0
P1450	RES1401	J1401	122.34	12	150	655.78	1.9	0.11
P1452	RES1402	J1403	91.36	12	150	909.23	2.6	0.15
P1460	J1401	RES1401	197.88	12	150	-505.82	1.4	0.11
P1462	J1406	RES1403	173.22	12	150	-587.38	1.7	0.13

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Source: Terrance E. Lowell & Associates

Min-MaxDay@J1

**TABLE D1.2**  
**Maximum Day Demands**  
**Junction Report**

**Minimum Pipe Sizes**

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-106	1.1	107	240	58
J1101	0.0	70	239	73
J1102	625.0	68	239	74
J1103	193.0	68	240	74
J1104	97.0	69	240	74
J1105	588.0	66	239	75
J1106	204.0	66	240	75
J1107	59.0	68	240	74
J1108	108.0	70	240	74
J1109	423.0	64	240	76
J1110	227.0	68	240	74
J1111	239.0	70	240	74
J1112	78.0	70	240	74
J1113	266.0	68	240	75
J1114	279.0	76	240	71
J1115	183.0	74	240	72
J1116	279.0	78	240	70
J1117	0.0	68	239	74
J1118	0.0	64	240	76
J1119	0.0	62	240	77
J1161	0.0	72	240	73
J-12	2.2	108	239	57
J1201	452.0	72	240	73
J1202	445.0	74	240	72
J1203	684.0	72	240	73
J1204	1022.0	82	240	68
J1205	278.0	85	240	67
J1206	161.0	110	240	56
J1207	255.0	77	239	70
J1208	73.0	77	240	70
J1210	245.0	71	239	73
J1211	49.0	74	239	72
J1212	113.0	76	240	71
J1213	78.0	79	240	70
J1214	52.0	70	240	74
J1215	0.0	83	240	68
J-125	0.0	100	240	61
J1301	628.0	69	240	74
J1302	382.0	71	240	73
J1303	223.0	86	240	67
J1304	454.0	72	239	73
J1305	350.0	77	239	70
J1306	412.0	80	240	69
J1307	577.0	81	240	69
J1308	0.0	84	240	68

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J1309	0.0	80	240	69
J1310	0.0	81	240	69
J1401	593.0	83	240	68
J1402	702.0	83	239	68
J1403	624.0	90	240	65
J1404	302.0	84	239	67
J1405	68.0	85	239	67
J1406	0.0	85	240	67
J1407	0.0	90	240	65
J-29	2.6	100	240	61
J-370	0.0	74	240	72
J-60	0.4	94	239	63
J-64	2.2	98	240	61
J-67	1.1	102	240	60
J-7	0.7	106	240	58
	13080.4			

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Source: Terrance E. Lowell & Associates

Min-MaxDay@A1

***Maximum Daily Demand +FF***

**TABLE D2**  
**Maximum Day + 5000 gpm Fire Flow at Any Node**  
**Junction Report**

**Minimum Pipe Sizes**

ID	Static Demand (gpm)	Static Pressure (psi)	Fire Flow Demand (gpm)	Residual Pressure (psi)	Critical Node ID	Critical Node Pressure (psi)	Critical Design Flow (gpm)
C-106	1.1	58	5000	20	J-106	20	4,256
J1101	0.0	73	5000	19	J1101	19	4,413
J1102	625.0	74	5000	64	J1206	56	12,563
J1103	193.0	74	5000	72	J1206	56	31,728
J1104	97.0	74	5000	69	J1206	56	17,696
J1105	588.0	75	5000	71	J1206	56	20,939
J1106	204.0	75	5000	72	J1206	56	22,583
J1107	59.0	74	5000	69	J1206	56	16,327
C1108	108.0	73	5000	65	J1206	56	12,755
J1109	423.0	76	5000	74	J1206	56	29,414
J1110	227.0	74	5000	71	J1206	56	23,643
J1111	239.0	74	5000	73	J1206	56	43,703
C1112	78.0	73	5000	69	J1206	56	17,533
J1113	266.0	74	5000	72	J1206	56	27,677
J1114	279.0	71	5000	68	J1206	56	22,042
J1115	183.0	72	5000	68	J1206	56	18,691
C1116	279.0	70	5000	66	J1206	56	18,861
J1117	0.0	74	5000	47	J1101	47	6,561
J1118	0.0	76	5000	74	J1206	56	27,689
J1119	0.0	77	5000	53	J1119	53	7,174
C1161	0.0	73	5000	44	J1161	44	6,182
C-12	2.2	57	5000	-3	J-12	-3	3,224
J1201	452.0	73	5000	71	J1206	56	33,822
J1202	445.0	72	5000	66	J1206	56	16,510
J1203	684.0	73	5000	71	J1206	56	35,533
J1204	1022.0	68	5000	66	J1206	56	28,977
J1205	278.0	67	5000	64	J1206	56	17,299
J1206	161.0	56	5000	54	J1206	54	18,894
J1207	255.0	70	5000	56	J-60	48	8,249
J1208	73.0	70	5000	63	J-67	53	11,262
J1210	245.0	73	5000	60	J1206	56	10,332
J1211	49.0	72	5000	56	J-60	53	8,689
J1212	113.0	71	5000	70	J1206	56	33,488
J1213	78.0	70	5000	58	J-67	51	10,027
J1214	52.0	74	5000	67	J1206	56	14,652
J1215	0.0	68	5000	36	J1215	36	5,454
J-125	0.0	61	5000	32	J-125	32	5,149
J1301	628.0	74	5000	72	J1206	56	34,322
J1302	382.0	73	5000	72	J1206	56	41,971
J1303	223.0	67	5000	34	J-7	26	4,857
J1304	454.0	73	5000	63	J1206	56	12,431
J1305	350.0	70	5000	60	J1206	56	11,092
J1306	412.0	69	5000	67	J1206	56	24,851

**TABLE D2**  
**Maximum Day + 5000 gpm Fire Flow at Any Node**  
**Junction Report**

**Minimum Pipe Sizes**

ID	Static Demand (gpm)	Static Pressure (psi)	Fire Flow Demand (gpm)	Residual Pressure (psi)	Critical Node ID	Critical Node Pressure (psi)	Critical Design Flow (gpm)
J1307	577.0	69	5000	65	J-106	56	19,408
J1308	0.0	68	5000	60	J-106	56	12,183
J1309	0.0	69	5000	67	J-106	55	21,375
J1310	0.0	69	5000	66	J-106	56	21,441
J1401	593.0	68	5000	67	J1206	56	48,136
J1402	702.0	68	5000	61	J-12	51	12,565
J1403	624.0	65	5000	63	J-12	56	31,021
J1404	302.0	67	5000	57	J-12	54	10,881
J1405	68.0	67	5000	58	J-12	52	11,615
J1406	0.0	67	5000	66	J1206	56	30,063
J1407	0.0	65	5000	43	J1407	43	6,418
C-29	2.6	61	5000	10	J-29	10	3,810
CJ-370	0.0	72	5000	70	J1206	56	29,905
C-60	0.4	63	5000	39	J-60	39	5,944
J-64	2.2	61	5000	45	J-64	45	7,153
C-67	1.1	60	5000	49	J-67	49	8,903
C-7	0.7	58	5000	8	J-7	8	3,632

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Source: Terrance E. Lowell & Associates

Min-Fire-5000@A1

***Peak Hour***

**TABLE D3.1**  
**Peak Hour Demand (1.6 \* Max Day)**  
**Pipe Report**

**Minimum Pipe Sizes**

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)
P1101	J1101	J1117	1,664	12	150	0.0	0.0	0
P1102	J1117	J1102	1,012	12	150	0.0	0.0	0
P1103	J1102	J1105	1,646	12	150	-334.4	1.0	0.42
P1104	J1105	J1110	2,248	12	150	-317.0	0.9	0.52
P1105	J1110	J1114	1,378	12	150	-22.2	0.1	0
P1106	J1103	J1106	1,655	12	150	203.2	0.6	0.17
P1107	J1106	J1111	2,267	12	150	-204.1	0.6	0.23
P1108	J1111	J1115	1,382	12	150	302.7	0.9	0.29
P1109	J1104	J1107	1,654	12	150	-239.0	0.7	0.23
P1110	J1107	C1108	1,012	12	150	315.8	0.9	0.23
P1111	C1108	C1112	1,273	12	150	143.0	0.4	0.07
P1112	C1112	C1116	1,381	12	150	218.4	0.6	0.16
P1113	J1102	J1103	1,292	12	150	-665.6	1.9	1.18
P1114	J1103	J1104	1,235	12	150	-50.3	0.1	0.01
P1115	J1104	J1201	2,055	12	150	33.4	0.1	0.01
P1116	J1105	J1106	1,297	12	150	-457.5	1.3	0.59
P1117	J1106	J1107	1,269	12	150	-376.7	1.1	0.4
P1118	J1107	C1161	1,425	12	150	0.0	0.0	0
P1120	J1109	J1110	2,017	12	150	340.8	1.0	0.53
P1121	J1110	J1111	1,314	12	150	-317.2	0.9	0.3
P1122	J1111	C1112	1,295	12	150	200.2	0.6	0.13
P1124	J1113	J1114	2,608	12	150	365.1	1.0	0.78
P1125	J1114	J1115	1,324	12	150	-45.3	0.1	0.01
P1126	J1115	C1116	1,312	12	150	-35.4	0.1	0.01
P1127	J1105	J1118	2,358	12	150	-500.7	1.4	1.27
P1128	J1118	J1119	1,331	12	150	0.0	0.0	0
P1150	J1118	RES1103	169	12	150	-500.7	1.4	0.09
P1152	J1103	RES1101	249	12	150	-1127.2	3.2	0.6
P1154	J1107	RES1102	180	12	150	-1025.8	2.9	0.37
P1156	J1201	RES1201	164	12	150	-1407.1	4.0	0.6
P1158	J1111	RES1105	147	12	150	-1406.6	4.0	0.54
P1160	J1109	RES1104	154	12	150	-1017.6	2.9	0.31
P1162	J1113	RES1301	167	12	150	-390.8	1.1	0.06
P1201	J1201	J1214	595	12	150	227.6	0.7	0.07
P1202	J1214	J1202	2,642	12	150	144.4	0.4	0.14
P1203	J1203	J1202	1,332	12	150	206.6	0.6	0.14
P1204	J1203	J1204	2,885	12	150	13.4	0.0	0
P1205	J1204	J1215	1,823	12	150	0.0	0.0	0
P1206	J1205	J1204	1,818	12	150	203.2	0.6	0.18
P1207	J1213	J1203	2,457	12	150	-186.8	0.5	0.21
P1208	J1213	C-67	524	12	150	62.0	0.2	0.01
P1209	J1202	J1212	1,925	12	150	-360.9	1.0	0.57
P1210	J1212	J1208	1,482	12	150	449.4	1.3	0.66
P1211	J1210	J1201	1,340	12	150	-489.7	1.4	0.69
P1212	J1211	J1210	1,413	12	150	-97.7	0.3	0.04

P1213	J1207	J1211	1,354	12	150	-19.3	0.1	0
P1215	J1208	J1207	1,263	12	150	389.3	1.1	0.43
P1216	J1208	C-67	756	12	150	-60.2	0.2	0.01
P1217	J1205	J1206	1,648	12	150	-302.7	0.9	0.35
P1218	J1205	J-125	1,535	12	150	0	0.0	0
P1219	J1208	J-64	528	12	150	3.6	0.0	0
P1220	J1207	C-60	583	12	150	0.6	0.0	0
P1250	J1206	RES1205	220	12	150	-560.3	1.6	0.15
P1252	J1204	RES1204	183	12	150	-1418.6	4.0	0.68
P1254	J1203	RES1203	165	12	150	-1501.2	4.3	0.68
P1256	J1212	RES1202	132	12	150	-991.2	2.8	0.25
P1301	J1301	J1304	783	12	150	652.1	1.9	0.69
P1302	J1304	J1305	3,559	12	150	-74.3	0.2	0.06
P1303	J1305	J1306	965	12	150	-634.3	1.8	0.81
P1304	J1306	J1307	3,263	12	150	-40.9	0.1	0.02
P1305	J1307	J1310	726	12	150	-364.6	1.0	0.22
P1306	J1307	J1309	1,019	12	150	-400.8	1.1	0.36
P1307	J1302	J1301	2,646	12	150	157.8	0.5	0.17
P1308	J-370	J1302	101	12	150	-263.4	0.8	0.02
P1309	C1116	J-370	958	12	150	-263.4	0.8	0.16
P1310	J1302	J1303	1,752	12	150	358.0	1.0	0.51
P1311	J1303	C-7	1,066	12	150	1.2	0.0	0
P1312	J1307	J1308	1,458	12	150	-198.6	0.6	0.14
P1313	J1308	J1310	778	12	150	-198.6	0.6	0.08
P1314	J1310	J1309	603	12	150	-325.5	0.9	0.15
P1315	J1309	C-106	2,109	12	150	1.8	0.0	0
P1320	J1301	J1114	1,922	12	150	58.2	0.2	0.02
P1350	J1113	RES1301	160	12	150	-399.8	1.1	0.06
P1352	RES1303	J1302	183	12	150	1390.4	3.9	0.65
P1354	J1301	RES1302	186	12	150	-1557.3	4.4	0.82
P1356	J1306	RES1304	220	12	150	-1252.6	3.6	0.65
P1358	J1309	RES1305	247	12	150	-728.1	2.1	0.27
P1401	J1310	J1401	1,125	12	150	-237.7	0.7	0.15
P1402	J1401	J1402	1,275	12	150	667.9	1.9	1.17
P1403	J1402	J1404	1,818	12	150	-111.3	0.3	0.06
P1404	J1404	J1406	1,446	12	150	-594.5	1.7	1.07
P1405	J1406	J1205	723	12	150	345.3	1.0	0.2
P1406	J1401	C-29	2,998	12	150	4.1	0.0	0
P1407	J1402	C-12	3,224	12	150	3.6	0.0	0
P1408	J1402	J1405	744	12	150	-347.6	1.0	0.2
P1409	J1405	J1403	1,921	12	150	-456.4	1.3	0.87
P1410	J1403	J1407	1,238	12	150	0.0	0.0	0
P1450	RES1401	J1401	122	12	150	1049.3	3.0	0.26
P1452	RES1402	J1403	91	12	150	1454.8	4.1	0.36
P1460	J1401	RES1401	198	12	150	-809.3	2.3	0.26
P1462	J1406	RES1403	173	12	150	-939.8	2.7	0.3

file: K:\1proj\12xx\1252\Wheatland Water Model-07-21-05.xls

Source: Terrance E. Lowell & Associates

Min-PeakHour@J1

**TABLE D3.2**  
**Peak Hour Demand (1.6 \* Max Day)**  
**Junction Report**

**Minimum Pipe Sizes**

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J-106	2	107	240	58
J1101	0	70	238	73
J1102	1000	68	238	74
J1103	309	68	239	74
J1104	155	69	239	74
J1105	941	66	239	75
J1106	326	66	239	75
J1107	94	68	240	74
J1108	173	70	239	73
J1109	677	64	240	76
J1110	363	68	239	74
J1111	382	70	239	73
J1112	125	70	239	73
J1113	426	68	240	75
J1114	446	76	239	71
J1115	293	74	239	72
J1116	446	78	239	70
J1117	0	68	238	74
J1118	0	64	240	76
J1119	0	62	240	77
J1161	0	72	240	73
J-12	4	108.06	239	57
J1201	723	72	239	73
J1202	712	74	239	72
J1203	1094	72	239	73
J1204	1635	82	239	68
J1205	445	85	240	67
J1206	258	110	240	56
J1207	408	77	239	70
J1208	117	77	239	70
J1210	392	71	239	73
J1211	78	74	239	71
J1212	181	76	240	71
J1213	125	79	239	69
J1214	83	70	239	73
J1215	0	83	239	68
J-125	0	100	240	60
J1301	1005	69	239	74
J1302	611	71	239	73
J1303	357	86	239	66
J1304	726	72	238	72
J1305	560	77	239	70
J1306	659	80	239	69
J1307	923	81	239	69
J1308	0	84	240	67

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J1309	0	80	240	69
J1310	0	81	240	69
J1401	949	83	240	68
J1402	1123	83	239	67
J1403	998	90	240	65
J1404	483	84	239	67
J1405	109	85	239	67
J1406	0	85	240	67
J1407	0	90	240	65
J-29	4	100	240	60
J-370	0	74	239	72
J-60	1	94	239	63
J-64	4	98	239	61
J-67	2	102	239	59
J-7	1	106	239	58
20929				

file: K:\1proj\12xx\1252\Wheatland Water Model-07-21-05.xls

Source: Terrance E. Lowell & Associates

Min-PeakHour@A1



**Table D4a: Pipe Summary All Conditions**

ID	Pipe Size Governing Scenario	Diameter (in) <sup>b</sup>	Maximum Day Velocity (ft/s) <sup>c</sup>	Peak Hour (1.6 * Max Day) Velocity (ft/s) <sup>c</sup>
P1101	Peak Hour	12	0.0	0.0
P1102	Peak Hour	12	0.0	0.0
P1103	Peak Hour	12	0.6	1.0
P1104	Peak Hour	12	0.6	0.9
P1105	Peak Hour	12	0.0	0.1
P1106	Peak Hour	12	0.4	0.6
P1107	Peak Hour	12	0.4	0.6
P1108	Peak Hour	12	0.5	0.9
P1109	Peak Hour	12	0.4	0.7
P1110	Peak Hour	12	0.6	0.9
P1111	Peak Hour	12	0.3	0.4
P1112	Peak Hour	12	0.4	0.6
P1113	Peak Hour	12	1.2	1.9
P1114	Peak Hour	12	0.1	0.1
P1115	Peak Hour	12	0.1	0.1
P1116	Peak Hour	12	0.8	1.3
P1117	Peak Hour	12	0.7	1.1
P1118	Peak Hour	12	0.0	0.0
P1120	Peak Hour	12	0.6	1.0
P1121	Peak Hour	12	0.6	0.9
P1122	Peak Hour	12	0.4	0.6
P1124	Peak Hour	12	0.7	1.0
P1125	Peak Hour	12	0.1	0.1
P1126	Peak Hour	12	0.1	0.1
P1127	Peak Hour	12	0.9	1.4
P1128	Peak Hour	12	0.0	0.0
P1150	Peak Hour	12	0.9	1.4
P1152	Peak Hour	12	2.0	3.2
P1154	Peak Hour	12	1.8	2.9
P1156	Peak Hour	12	2.5	4.0
P1158	Peak Hour	12	2.5	4.0
P1160	Peak Hour	12	1.8	2.9
P1162	Peak Hour	12	0.7	1.1
P1201	Peak Hour	12	0.4	0.7
P1202	Peak Hour	12	0.3	0.4
P1203	Peak Hour	12	0.4	0.6
P1204	Peak Hour	12	0.0	0.0
P1205	Peak Hour	12	0.0	0.0
P1206	Peak Hour	12	0.4	0.6
P1207	Peak Hour	12	0.3	0.5
P1208	Peak Hour	12	0.1	0.2
P1209	Peak Hour	12	0.6	1.0
P1210	Peak Hour	12	0.8	1.3
P1211	Peak Hour	12	0.9	1.4
P1212	Peak Hour	12	0.2	0.3
P1213	Peak Hour	12	0.0	0.1
P1215	Peak Hour	12	0.7	1.1
P1216	Peak Hour	12	0.1	0.2
P1217	Peak Hour	12	0.5	0.9
P1218	Peak Hour	12	0.0	0.0
P1219	Peak Hour	12	0.0	0.0
P1220	Peak Hour	12	0.0	0.0
P1250	Peak Hour	12	1.0	1.6
P1252	Peak Hour	12	2.5	4.0

ID	Pipe Size Governing Scenario	Diameter (in) <sup>a</sup>	Maximum Day Velocity (ft/s) <sup>a</sup>	Peak Hour (1.6 * Max Day) Velocity (ft/s) <sup>a</sup>
P1254	Peak Hour	12	2.7	4.3
P1256	Peak Hour	12	1.8	2.8
P1301	Peak Hour	12	1.2	1.9
P1302	Peak Hour	12	0.1	0.2
P1303	Peak Hour	12	1.1	1.8
P1304	Peak Hour	12	0.1	0.1
P1305	Peak Hour	12	0.7	1.0
P1306	Peak Hour	12	0.7	1.1
P1307	Peak Hour	12	0.3	0.5
P1308	Peak Hour	12	0.5	0.8
P1309	Peak Hour	12	0.5	0.8
P1310	Peak Hour	12	0.6	1.0
P1311	Peak Hour	12	0.0	0.0
P1312	Peak Hour	12	0.4	0.6
P1313	Peak Hour	12	0.4	0.6
P1314	Peak Hour	12	0.6	0.9
P1315	Peak Hour	12	0.0	0.0
P1320	Peak Hour	12	0.1	0.2
P1350	Peak Hour	12	0.7	1.1
P1352	Peak Hour	12	2.5	3.9
P1354	Peak Hour	12	2.8	4.4
P1356	Peak Hour	12	2.2	3.6
P1358	Peak Hour	12	1.3	2.1
P1401	Peak Hour	12	0.4	0.7
P1402	Peak Hour	12	1.2	1.9
P1403	Peak Hour	12	0.2	0.3
P1404	Peak Hour	12	1.1	1.7
P1405	Peak Hour	12	0.6	1.0
P1406	Peak Hour	12	0.0	0.0
P1407	Peak Hour	12	0.0	0.0
P1408	Peak Hour	12	0.6	1.0
P1409	Peak Hour	12	0.8	1.3
P1410	Peak Hour	12	0.0	0.0
P1450	Peak Hour	12	1.9	3.0
P1452	Peak Hour	12	2.6	4.1
P1460	Peak Hour	12	1.4	2.3
P1462	Peak Hour	12	1.7	2.7

<sup>a</sup> Shaded numbers indicate the maximum velocity in the system under the given condition.

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Source: Terrance E. Lowell & Associates

Sum-A@A1

Table D4b: Junction Summary All Conditions

ID	Elevation (ft)	Max Day Demand (gpm)	MD + 5000gpm Fire Flow at Any Node Demand (gpm)	Peak Hour Demand [1.6 * MD] (gpm)	MD + 5000gpm		MD + 5000gpm		Peak Hour (1.6 * Max Day) Pressure (psi) <sup>a</sup>	
					Maximum Day Pressure (psi) <sup>a</sup>	Critical Node	Fire Flow at Any Node			
							Critical Node	Critical Node Pressure (psi) <sup>a</sup>		Static
C-106	107	1.1	5001.1	1.8	58	J-106	20	58	20	58
J1101	70	0.0	5000.0	0.0	73	J1101	19	73	19	73
J1102	68	625.0	5625.0	1000.0	74	J1206	56	74	64	74
J1103	68	193.0	5193.0	308.8	74	J1206	56	74	72	74
J1104	69	97.0	5097.0	155.2	74	J1206	56	74	69	74
J1105	66	588.0	5588.0	940.8	75	J1206	56	75	71	75
J1106	66	204.0	5204.0	326.4	75	J1206	56	75	72	75
J1107	68	59.0	5059.0	94.4	74	J1206	56	74	69	74
C1108	70	108.0	5108.0	172.8	74	J1206	56	73	65	73
J1109	64	423.0	5423.0	676.8	76	J1206	56	76	74	76
J1110	68	227.0	5227.0	363.2	74	J1206	56	74	71	74
J1111	70	239.0	5239.0	382.4	74	J1206	56	74	73	73
C1112	70	78.0	5078.0	124.8	74	J1206	56	73	69	73
J1113	68	266.0	5266.0	425.6	75	J1206	56	74	72	75
J1114	76	279.0	5279.0	446.4	71	J1206	56	71	68	71
J1115	74	183.0	5183.0	292.8	72	J1206	72	72	68	72
C1116	78	279.0	5279.0	446.4	70	J1206	56	70	66	70
J1117	68	0.0	5000.0	0.0	74	J1101	47	74	47	74
J1118	64	0.0	5000.0	0.0	76	J1206	56	76	74	76
J1119	62	0.0	5000.0	0.0	77	J1119	53	77	53	77
C1161	72	0.0	5000.0	0.0	73	J1161	44	73	44	73
C-12	108	2.2	5002.2	3.6	57	J-12	3	57	3	57
J1201	72	452.0	5452.0	723.2	73	J1206	56	73	71	73
J1202	74	445.0	5445.0	712.0	72	J1206	56	72	66	72
J1203	72	684.0	5684.0	1094.4	73	J1206	56	73	71	73
J1204	82	1022.0	6022.0	1635.2	68	J1206	56	68	66	68
J1205	85	278.0	5278.0	444.8	67	J1206	56	67	64	67
J1206	110	161.0	5161.0	257.6	56	J1206	54	56	54	56
J1207	77	255.0	5255.0	408.0	70	J-60	48	70	56	70
J1208	77	73.0	5073.0	116.8	70	J-67	53	70	63	70
J1210	71	245.0	5245.0	392.0	73	J1206	56	73	60	73
J1211	74	49.0	5049.0	78.4	72	J-60	53	72	56	71
J1212	76	113.0	5113.0	180.8	71	J1206	56	71	70	71
J1213	79	78.0	5078.0	124.8	70	J-67	51	70	58	69
J1214	70	52.0	5052.0	83.2	74	J1206	56	74	67	73
J1215	83	0.0	5000.0	0.0	68	J1215	36	68	36	68
J-125	100	0.0	5000.0	0.0	61	J-125	32	61	32	60
J1301	69	628.0	5628.0	1004.8	74	J1206	56	74	72	74
J1302	71	382.0	5382.0	611.2	73	J1206	56	73	72	73
J1303	86	223.0	5223.0	356.8	67	J-7	26	67	34	66
J1304	72	454.0	5454.0	726.4	73	J1206	56	73	63	72
J1305	77	350.0	5350.0	560.0	70	J1206	56	70	60	70
J1306	80	412.0	5412.0	659.2	69	J1206	56	69	67	69
J1307	81	577.0	5577.0	923.2	69	J-106	56	69	65	69
J1308	84	0.0	5000.0	0.0	68	J-106	56	68	60	67
J1309	80	0.0	5000.0	0.0	69	J-106	55	69	67	69
J1310	81	0.0	5000.0	0.0	69	J-106	56	69	66	69
J1401	83	593.0	5593.0	948.8	68	J1206	56	68	67	68
J1402	83	702.0	5702.0	1123.2	68	J-12	51	68	61	67

Table D4b: Junction Summary All Conditions

ID	Elevation (ft)	Max Day Demand (gpm)	MD + 5000gpm		Peak Hour Demand [1.6 * MD] (gpm)	Maximum Day Pressure (psi) <sup>a</sup>		MD + 5000gpm		MD + 5000gpm		Peak Hour (1.6 * Max Day) Pressure (psi) <sup>a</sup>
			Fire Flow at Any Node Demand (gpm)			Critical Node	Critical Node Pressure (psi) <sup>a</sup>	Fire Flow		Static	Residual	
J1403	90	624.0	5624.0		998.4	65	J-12	56	65	63	65	67
J1404	84	302.0	5302.0		483.2	67	J-12	54	67	57	67	67
J1405	85	68.0	5068.0		108.8	67	J-12	52	67	58	67	67
J1406	85	0.0	5000.0		0.0	67	J1206	56	67	66	67	67
J1407	90	0.0	5000.0		0.0	65	J1407	43	65	43	65	65
C-29	100	2.6	5002.6		4.1	61	J-29	10	61	10	60	60
CJ-370	74	0.0	5000.0		0.0	72	J1206	56	72	70	72	72
C-60	94	0.4	5000.4		0.6	63	J-60	39	63	39	63	63
J-64	98	2.2	5002.2		3.6	61	J-64	45	61	45	61	61
C-67	102	1.1	5001.1		1.8	60	J-67	49	60	49	59	59
C-7	106	0.7	5000.7		1.2	58	J-7	8	58	8	58	58

Shaded numbers indicate the minimum pressure in the system under the given condition.

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Source: Terrance E. Lowell & Associates

Sum-B@A1

## **APPENDIX E**



**TABLE E2**  
**WHEATLAND GPU**  
**MAJOR INFRASTRUCTURE**  
**September 12, 2005**

**WATER**

VILLAGE NO	ZONING	DESCRIPTION	ACRES	DWELLING UNITS	WATER DEMANDS: GPU area			WATER max day gpm	PORTION OF WATER COST BACKBONE	TOTAL ADJUSTED WATER
					maximum day	gpd/edu #	1150			
					gpd/unit	total gpd	edu's			
100	UR	Urban Reserve	0.00	0	0	-	-	-	-	\$ -
101	UR	Urban Reserve	427.57	0	0	-	-	-	-	\$ -
102	UR	Urban Reserve	86.74	0	0	-	-	-	-	\$ -
103	UR	Urban Reserve	16.75	0	0	-	-	-	-	\$ -
104	OS	Open Space	3.42	0	0	-	-	-	-	\$ -
105	LDR	Low Density Residential	90.30	361.2	1150	415,380	361	288	808,178	\$ 808,178
106	P	Park	7.53	0	9000	67,770	59	47	131,856	\$ 131,856
107	OS	Open Space	3.39	0	0	-	-	-	-	\$ -
108	LDR	Low Density Residential	4.79	19.16	1150	22,034	19	15	42,870	\$ 42,870
109	E	Employment	24.08	0	5750	138,460	120	96	269,393	\$ 269,393
110	C	Commercial	24.06	0	5750	138,345	120	96	269,169	\$ 269,169
111	HDR	High Density Residential	22.26	356.16	690	245,750	214	171	478,140	\$ 478,140
112	MDR	Medium Density Residential	12.25	98	1150	112,700	98	78	219,273	\$ 219,273
113	LMDR	Low/Medium Density Res.	66.92	334.6	1150	384,790	335	267	748,661	\$ 748,661
114	OS	Open Space	0.85	0	0	-	-	-	-	\$ -
115	LDR	Low Density Residential	83.82	335.28	1150	385,572	335	268	750,182	\$ 750,182
116	OS	Open Space	4.97	0	0	-	-	-	-	\$ -
117	LDR	Low Density Residential	14.53	58.12	1150	66,838	58	46	130,042	\$ 130,042
118	OS	Open Space	3.41	0	0	-	-	-	-	\$ -
119	LDR	Low Density Residential	60.24	240.96	1150	277,104	241	192	539,143	\$ 539,143
120	LDR	Low Density Residential	150.92	603.68	1150	694,232	604	482	1,350,721	\$ 1,350,721
121	LMDR	Low/Medium Density Res.	67.71	338.55	1150	389,333	339	270	757,499	\$ 757,499
122	LDR	Low Density Residential	38.07	152.28	1150	175,122	152	122	340,723	\$ 340,723
123	LMDR	Low/Medium Density Res.	17.24	86.2	1150	99,130	86	69	192,871	\$ 192,871
124	MDR	Medium Density Residential	33.56	268.48	1150	308,752	268	214	600,718	\$ 600,718
125	ES	K-6 School	10.27	0	8000	82,160	71	57	159,853	\$ 159,853
126	P	Park	6.05	0	9000	54,450	47	38	105,940	\$ 105,940
127	LDR	Low Density Residential	32.07	128.28	1150	147,522	128	102	287,024	\$ 287,024
128	PB	Other Public	10.32	0	5750	59,340	52	41	115,454	\$ 115,454
129	ES	K-6 School	11.77	0	8000	94,160	82	65	183,201	\$ 183,201
130	P	Park	9.42	0	9000	84,780	74	59	164,951	\$ 164,951
131	LDR	Low Density Residential	29.38	117.52	1150	135,148	118	94	262,949	\$ 262,949
200	E	Employment	78.56	0	5750	451,720	393	314	878,882	\$ 878,882
201	P	Park	1.26	0	9000	11,340	10	8	22,063	\$ 22,063
202	P	Park	1.56	0	9000	14,040	12	10	27,317	\$ 27,317
203	LDR	Low Density Residential	273.53	1094.12	1150	1,258,238	1,094	874	2,448,071	\$ 2,448,071
204	C	Commercial	2.61	0	5750	15,008	13	10	29,199	\$ 29,199
205	LDR	Low Density Residential	187.13	748.52	1150	860,798	749	598	1,674,798	\$ 1,674,798
206	P	Park	1.53	0	9000	13,770	12	10	26,791	\$ 26,791
207	OS	Open Space	16.30	0	0	-	-	-	-	\$ -
208	OS	Open Space	2.15	0	0	-	-	-	-	\$ -
209	OS	Open Space	1.22	0	0	-	-	-	-	\$ -
210	E	Employment	9.94	0	5750	57,155	50	40	111,203	\$ 111,203
211	LDR	Low Density Residential	2.84	11.36	1150	13,064	11	9	25,418	\$ 25,418
212	MDR	Medium Density Residential	15.27	122.16	1150	140,484	122	98	273,330	\$ 273,330
213	HDR	High Density Residential	10.46	167.36	690	115,478	100	80	224,679	\$ 224,679
214	MDR	Medium Density Residential	3.49	27.92	1150	32,108	28	22	62,470	\$ 62,470
215	LMDR	Low/Medium Density Res.	45.40	227	1150	261,050	227	181	507,908	\$ 507,908
216	OS	Open Space	3.65	0	0	-	-	-	-	\$ -
217	ES	K-6 School	10.70	0	8000	85,600	74	59	166,546	\$ 166,546
218	P	Park	8.51	0	9000	78,590	67	53	149,016	\$ 149,016
219	P	Park	1.45	0	9000	13,060	11	9	25,391	\$ 25,391
220	MS	Middle School	16.85	0	9000	151,650	132	105	295,055	\$ 295,055
221	P	Park	4.69	0	9000	42,210	37	29	82,125	\$ 82,125
222	ES	K-6 School	10.34	0	8000	82,720	72	57	160,943	\$ 160,943
223	MDR	Medium Density Residential	20.60	164.8	1150	189,520	165	132	368,737	\$ 368,737
224	OS	Open Space	4.65	0	0	-	-	-	-	\$ -
225	OS	Open Space	23.15	0	0	-	-	-	-	\$ -
226	LMDR	Low/Medium Density Res.	13.46	67.3	1150	77,395	67	54	150,582	\$ 150,582
227	OS	Open Space	1.13	0	0	-	-	-	-	\$ -
228	LMDR	Low/Medium Density Res.	6.91	34.55	1150	39,733	35	28	77,305	\$ 77,305
229	MDR	Medium Density Residential	20.31	162.48	1150	186,852	162	130	363,546	\$ 363,546
230	C	Commercial	10.26	0	5750	58,995	51	41	114,783	\$ 114,783
231	C	Commercial	21.00	0	5750	120,750	105	84	234,935	\$ 234,935
232	E	Employment	107.11	0	5750	615,883	536	428	1,198,282	\$ 1,198,282
233	UR	Urban Reserve	1250.00	0	0	-	-	-	-	\$ -
234	HS	High School	45.40	0	9000	408,600	355	284	794,986	\$ 794,986
235	E	Employment	1.92	0	5750	11,040	10	8	21,480	\$ 21,480
236	LDR	Low Density Residential	0.92	3.68	1150	4,232	4	3	8,234	\$ 8,234
237	MDR	Medium Density Residential	8.38	67.04	1150	77,096	67	54	150,001	\$ 150,001
238	LDR	Low Density Residential	2.36	9.44	1150	10,866	9	8	21,122	\$ 21,122

**TABLE E2**  
**WHEATLAND GPU**  
**MAJOR INFRASTRUCTURE**  
**September 12, 2005**

**WATER**

VILLAGE NO	ZONING	DESCRIPTION	ACRES	DWELLING UNITS	WATER DEMANDS: GPU area			WATER max day gpm	PORTION OF WATER COST	
					maximum day	gpd/edu =	1150		BACKBONE	TOTAL ADJUSTED WATER
					gpd/unit	total gpd	edu's			
300	UR	Urban Reserve	5.16	0	0	-	-	-	-	\$ -
301	LDR	Low Density Residential	66.06	264.24	1150	303,876	264	211	591,232	\$ 591,232
302	OS	Open Space	8.28	0	0	-	-	-	-	\$ -
303	LDR	Low Density Residential	144.47	577.88	1150	664,562	578	462	1,292,995	\$ 1,292,995
304	LMDR	Low/Medium Density Res.	14.98	74.9	1150	86,135	75	60	167,587	\$ 167,587
305	LDR	Low Density Residential	85.60	342.4	1150	393,760	342	273	766,113	\$ 766,113
306	ES	K-6 School	8.63	0	8000	69,040	60	48	134,327	\$ 134,327
307	P	Park	2.75	0	9000	24,750	22	17	48,154	\$ 48,154
308	C	Commercial	2.44	0	5750	14,030	12	10	27,297	\$ 27,297
309	HS	High School	5.78	0	9000	52,020	45	36	101,212	\$ 101,212
310	OS	Open Space	7.23	0	0	-	-	-	-	\$ -
311	C	Commercial	3.83	0	5750	22,023	19	15	42,848	\$ 42,848
312	MDR	Medium Density Residential	23.29	186.32	1150	214,268	186	149	416,887	\$ 416,887
313	MDR	Medium Density Residential	3.52	28.16	1150	32,384	28	22	63,007	\$ 63,007
314	LMDR	Low/Medium Density Res.	34.31	171.55	1150	197,283	172	137	383,840	\$ 383,840
315	P	Park	43.53	0	9000	391,770	341	272	762,241	\$ 762,241
316	LMDR	Low/Medium Density Res.	19.76	98.8	1150	113,620	99	79	221,063	\$ 221,063
317	LDR	Low Density Residential	137.16	548.64	1150	630,936	549	438	1,227,571	\$ 1,227,571
318	MDR	Medium Density Residential	22.06	176.48	1150	202,952	176	141	394,870	\$ 394,870
319	HDR	High Density Residential	5.17	82.72	690	57,077	50	40	111,051	\$ 111,051
320	HDR	High Density Residential	1.14	18.24	690	12,586	11	9	24,487	\$ 24,487
321	LDR	Low Density Residential	1.46	5.84	1150	6,716	6	5	13,067	\$ 13,067
322	P	Park	4.28	0	9000	38,520	33	27	74,946	\$ 74,946
323	ES	K-6 School	10.63	0	8000	65,040	74	59	165,457	\$ 165,457
324	LDR	Low Density Residential	69.60	278.4	1150	320,160	278	222	622,914	\$ 622,914
325	OS	Open Space	1.64	0	0	-	-	-	-	\$ -
326	MDR	Medium Density Residential	13.37	106.96	1150	123,004	107	85	239,321	\$ 239,321
327	HDR	High Density Residential	5.89	94.24	690	65,026	57	45	126,516	\$ 126,516
328	LMDR	Low/Medium Density Res.	13.19	65.95	1150	75,843	66	53	147,562	\$ 147,562
329	OS	Open Space	1.45	0	0	-	-	-	-	\$ -
330	LDR	Low Density Residential	185.26	741.04	1150	852,196	741	592	1,658,062	\$ 1,658,062
331	HDR	High Density Residential	8.81	140.96	690	97,262	85	68	189,237	\$ 189,237
332	C	Commercial	13.45	0	5750	77,338	67	54	150,470	\$ 150,470
333	WWTP	Wastewater Plant	28.96	0	300	8,688	8	6	16,904	\$ 16,904
334	PB	Other Public	3.79	0	5750	21,793	19	15	42,400	\$ 42,400
335	C	Commercial	6.73	0	5750	38,698	34	27	75,291	\$ 75,291
336	OS	Open Space	19.19	0	0	-	-	-	-	\$ -
400	MDR	Medium Density Residential	45.61	364.88	1150	419,612	365	291	816,411	\$ 816,411
401	OS	Open Space	4.97	0	0	-	-	-	-	\$ -
402	LDR	Low Density Residential	6.37	25.48	1150	29,302	25	20	57,011	\$ 57,011
403	LDR	Low Density Residential	19.29	77.16	1150	88,734	77	62	172,644	\$ 172,644
404	LDR	Low Density Residential	19.80	79.2	1150	91,080	79	63	177,208	\$ 177,208
405	LMDR	Low/Medium Density Res.	64.63	323.15	1150	371,623	323	258	723,041	\$ 723,041
406	OS	Open Space	5.83	0	0	-	-	-	-	\$ -
407	MS	Middle School	20.00	0	9000	180,000	157	125	350,214	\$ 350,214
408	LDR	Low Density Residential	118.62	474.48	1150	545,652	474	379	1,061,639	\$ 1,061,639
409	ES	K-6 School	9.41	0	8000	75,280	65	52	146,467	\$ 146,467
410	P	Park	2.45	0	9000	22,050	19	15	42,901	\$ 42,901
411	HDR	High Density Residential	8.14	130.24	690	89,666	78	62	174,846	\$ 174,846
412	P	Park	4.10	0	9000	36,900	32	26	71,794	\$ 71,794
413	UR	Urban Reserve	2950.00	0	0	-	-	-	-	\$ -
414	E	Employment	77.31	0	5750	444,533	387	309	864,898	\$ 864,898
415	LMDR	Low/Medium Density Res.	20.04	100.2	1150	115,230	100	80	224,195	\$ 224,195
416	LMDR	Low/Medium Density Res.	50.06	250.3	1150	287,845	250	200	560,041	\$ 560,041
417	MDR	Medium Density Residential	19.16	153.2	1150	176,180	153	122	342,782	\$ 342,782
418	OS	Open Space	4.61	0	0	-	-	-	-	\$ -
419	C	Commercial	19.27	0	5750	110,803	96	77	215,581	\$ 215,581
420	HDR	High Density Residential	8.67	138.72	690	95,717	83	66	186,230	\$ 186,230
421	OS	Open Space	0.54	0	0	-	-	-	-	\$ -
422	OS	Open Space	17.20	0	0	-	-	-	-	\$ -
423	CC	Civic Center	21.81	0	5750	125,408	109	87	243,997	\$ 243,997
424	MDR	Medium Density Residential	2.78	22.24	1150	25,576	22	18	49,762	\$ 49,762
425	C	Commercial	9.71	0	5750	55,833	49	39	108,630	\$ 108,630
426	MDR	Medium Density Residential	3.99	31.92	1150	36,708	32	25	71,420	\$ 71,420
427	MDR	Medium Density Residential	1.68	13.44	1150	15,456	13	11	30,072	\$ 30,072
428	C	Commercial	5.19	0	5750	29,843	26	21	58,063	\$ 58,063
429	OS	Open Space	1.80	0	0	-	-	-	-	\$ -
430	MDR	Medium Density Residential	4.15	33.2	1150	38,180	33	27	74,284	\$ 74,284
431	OS	Open Space	0.78	0	0	-	-	-	-	\$ -
432	MDR	Medium Density Residential	2.64	21.12	1150	24,288	21	17	47,256	\$ 47,256
Total Wheatland GPU			8205.1	12649		18,900,944	16,436	13,126	\$ 36,774,321	\$ 36,774,321